TECHNICAL MANUAL

MODEL 4010

Central Electronics

Includes:

Model 4001	*Control Station for 4 IFB, 1 SA*
Model 4001M	*Control Station for 4 IFB, 1 SA with Microphone*
Model 4002	*Control Station for 8 IFB, 2 SA*
Model 4002M	*Control Station for 8 IFB, 2 SA with Microphone*
Model 4003	*Control Station for 12 IFB, 3 SA*
Model 4003M	*Control Station for 12 IFB, 3 SA with Microphone*
Model 4020	*Portable User Station / Talent Electronics*

RTS™

9300-2594-00 Rev G 6/00

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Blue Earth, MN 56013 U.S.A.

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TABLE OF CONTENTS

SECTION 1: INTRODUCTION AND SPECIFICATIONS 1-1
1.1 INTRODUCTION 1-1
1.2 USER STATION MODEL 4020 1-1
1.3 CENTRAL ELECTRONICS MODEL 4010 1-1
1.4 CONTROL STATION MODELS 4001, 4002, 4003 / 4001M, 4002M, 4003M 1-2
1.5 SPLITTER ASSEMBLY MODELS 4022 AND 4025A 1-2
1.6 SPECIAL OPTIONS 1-2
1.7 SPECIFICATIONS 1-3
1.7.1 MODEL 4010 CENTRAL ELECTRONICS 1-3
1.7.2 MODELS 4001/4001M, 4002/4002M, 4003/4003M 1-3
SECTION 2: INSTALLATION 2-1
2.1 STANDARD INSTALLATION 2-1
2.1.1 INPUT ELECTRICAL POWER (MAINS) 2-1
2.1.2 CONFIGURATIONS 2-1
2.1.3 WIRE AND CABLE CONSIDERATIONS 2-1
2.1.4 CONNECTION TO EXISTING MICROPHONES, "TW" TYPE USER STATIONS & OTHER SOURCES . 2-1
2.2 OPTIONS INSTALLATION 2-1
2.2.1 SETTING UP PRIORITY 2-2
2.2.2 SETTING UP SPEAKER MUTING ZONES 2-2
2.2.3 RETURN IFB INSTALLATIONS 2-2
2.2.4 EXPANDING THE CONTROL STATION"S ALL FUNCTION 2-2
2.2.5 MONO IFB 2-2
SECTION 3: OPERATING INSTRUCTIONS 3-1
3.1 INTRODUCTION 3-1
3.2 SETUP AND OPERATION OF THE CENTRAL ELECTRONICS, MODEL 4010 3-1
3.3 CONTROL STATION OPERATION MODELS 4001/4001M, 4002/4002M, 4003/4003M 3-1
3.4 USER STATION OPERATION, MODEL 4020 3-1
3.5 SUBSTITUTING "TW" INTERCOM STATIONS FOR IFB USER STATIONS 3-1
3.6 OPERATING WITH TELCO DRY PAIR(S) 3-2
3.7 OPERATING DISTANCES 3-2
SECTION 4: THEORY OF OPERATION 4-1
4.1 INTRODUCTION 4-1
4.2 OVERALL FUNCTIONAL DESCRIPTION 4-1
4.3 CENTRAL ELECTRONICS FUNCTIONAL DESCRIPTION 4-1
4.4 CONTROL STATION FUNCTIONAL DESCRIPTION 4-3
4.5 USER STATION FUNCTIONAL DESCRIPTION 4-4
4.6 RETURN IFB FUNCTIONAL DESCRIPTION 4-4
SECTION 5: MAINETNANCE 5-1
5.1 INTRODUCTION 5-1
5.2 SERVICE INFORMATION 5-1
5.3 GENERAL MAINTENANCE 5-1
5.3.1 INPUT POWER SELECTION 5-1
5.3.2 CLEANING 5-1
5.3.3 FUSE REPLACEMENT 5-1

TABLE OF CONTENTS (Continued)

5.4 PERFORMANCE CHECK 5-5
5.4.1 MODEL 4010 TEST PROCEDURE 5-5
5.4.2 MODEL 4001 CONTROL STATION MIC PRE TEST PROCEDURE 5-5
5.4.3 MODEL 4001 IFB CONTROL STATION TEST PROCEDURE 5-6
5.4.4 MODEL 4002 IFB CONTROL STATION TEST PROCEDURE 5-6
5,4,5 MODEL 4003 IFB CONTROL STATION TEST PROCEDURE 5-7
5.4.6 MODEL 4020 USER STATION TEST PROCEDURE 5-8
5.5 TROUBLESHOOTING 5-8
SECTION 6: LISTS OF REPLACEABLE PARTS 6-1
6.1 INTRODUCTION 6-1
6.2 HOW TO OBTAIN PARTS 6-1
6.3 SHIPPING LIST MODEL 4001 — 9000-2359-00 6-1
6.3.1 FINAL ASSEMBLY, MODEL 4001 — 9010-2003-00 6-1
6.3.2 PRINTED CIRCUIT ASSY, MODEL 4001, MIC PRE BOARD, CC4000 — 9030-1999-00 6-2
6.3.3 FRONT PANEL, MODEL 4001 — 9070-2006-00 6-3
6.3.3.1 FRONT PANEL, MODEL 4001M GOOSENECK — 9070-2360-00 6-3
6.4 SHIPPING LIST, MODEL 4002 — 9000-2361-00 6-3
6.4.1 FINAL ASSEMBLY, MODEL 4002 — 9010-2011-00 6-3
6.4.2 PRINTED CIRCUIT ASSY, MODEL 4002, MIC PRE BOARD, CC4000 — 9030-1999-00 6-4
6.4.3 PRINTED CIRCUIT ASSY, MODEL 4002, SWITCH BOARD — 9030-4376-00 6-5
6.4.5 FRONT PANEL, MODEL 4002 — 9070-2014-00 6-5
6.4.5.1 FRONT PANEL, MODEL 4002M GOOSENECK — 9070-2361-00 6-5
6.5 SHIPPING LIST, MODEL 4003 — 9000-2363-00 6-5
6.5.1 FINAL ASSEMBLY, MODEL 4003 — 9010-2019-00 6-6
6.5.2 PRINTED CIRCUIT ASSY, MODEL 4003, MIC PRE BOARD, CC4000 — 9030-1999-00 6-6
6.5.3 PRINTED CIRCUIT ASSY, MODEL 4003, SWITCH BOARD, CC4000 — 9030-4377-00 6-7
6.5.4 FRONT PANEL, MODEL 4003 — 9070-2022-00 6-7
6.5.4.1 FRONT PANEL, MODEL 4003M GOOSENECK — 9070-2364-00 6-7
6.5.5 SHIPPING LIST, MODEL 4010 — 9000-2365-00 6-8
6.5.6 FINAL ASSEMBLY, MODEL 4010 — 9010-2138-00 6-8
6.5.7 BACK PANEL ASSEMBLY, MODEL 4010 — 9020-2139-00 6-8
6.5.8 PRINTED CIRCUIT ASSEMBLY, MODEL 4010, CC4010 — 9030-1974-00 6-9
6.5.9 FRONT PANEL, MODEL 4010 — 9070-1977-00 6-11
6.6 SHIPPING LIST, MODEL 4020 — 9000-2368-00 6-11
6.6.1 FINAL ASSEMBLY, MODEL 4020 — 9010-1927-00 6-12
6.6.2 BACK PANEL ASSEMBLY, MODEL 4020 — 9020-1926-00 6-12
6.6.3 PRINTED CIRCUIT ASSEMBLY, MODEL 4020 — 9030-1904-00 6-12
APPENDIX A A-1
APPENDIX B B-1
NOTES N-1
SECTION 7: DIAGRAMS 7-1

SECTION 1: INTRODUCTION AND SPECIFICATIONS

1.1 INTRODUCTION

This IFB System is a one-way Interruptible FeedBack* communications system (a program interrupt system) created especially to meet the critical requirements of the television broadcast industry, as well as other live or recorded media applications. The system is composed of User Stations, Central Electronics and Control Panels. A modular approach assures the optimum configuration for each installation. Should system expansion be desired, additional components may be added as necessary. A typical system may consist of the following: up to four Control Panels, one Central Electronics unit, four User Stations, and assorted cabling and interconnect units. The maximum standard configuration allows four Control Panels, three Central Electronics, and twelve User Stations.

1.2 USER STATION MODEL 4020

The User Station, a small "belt pack" package, allows the talent to receive the audio signals designated by the Central Electronics and the Control Stations and may be worn by talent, such as newscasters, musicians, sportscasters, etc. Behind-the-scenes personnel may also find the IFB feeds useful for production coordination and control. These may be production assistants, audio boom operators, stage monitor mixers, "on stage" producers, etc. Each belt pack contains the necessary electronics to provide a stereo audio signal to the user. Two power amplifiers rated at 1/2 watt each are capable of driving any set of headphones or loudspeakers. Thus, the IFB can be conveniently extended to dressing rooms or other off-camera areas where communications is desirable.

The line input to the belt pack is driven from the Central Electronics unit. This signal contains the audio information as well as the DC voltage necessary to power the belt pack. Both the left and right signals are carried on a standard two-conductor microphone cable. The left channel is designated as interruptible, the right channel, noninterruptible. Separate jacks are provided for mono and stereo headphones. Individual left and right volume controls on the belt pack enable the user to adjust listening levels for personal comfort. When mono headphones are used, they are fed only the left channel program -- interrupted program audio.

A standard TW Intercom belt pack is fully compatible with this system and may be used in place of the Model 4020 User Station if necessary.

*"IFB" is also known as "IRF, Interrupted Return Feed" and "foldback".

1.3 CENTRAL ELECTRONICS MODEL 4010

The Central Electronics unit contains all the necessary control functions and electronics to provide the active link between the Control Station and the User Station. It accepts three program inputs, four microphone inputs and switch keying signal inputs from up to four Control Stations. In addition, it supplies composite output feeds to the User Station belt packs, line-level audio feeds to the Stage Announce (SA) amplifier, relay contacts for monitor muting, and interconnection to the Control Stations.

The three bridging program inputs are available on a rear-panel terminal strip. These signals are attenuated and fed to eight front-panel selector switches that assign any one of the three program sources to the respective front-panel level control. The output of this level control is fed to a driver amplifier which sends audio to the noninterrupted output. This uninterrupted signal feeds the User Station right channel line input. For the interrupted channel, the output of the level control is fed to an electronic switch then to a summing amplifier. The summing amplifier drives a power output stage which adds the audio signal to a 29 volt DC potential. This audio feeds the User Station left channel line input. This allows for program interrupt in the left channel only. However, the right channel may be assigned the same signal as the left channel via an internal circuit board switch. The User Station may now have the interrupt signal in both ears when using stereo headphones.

The SA (Stage Announce)* feature routes any of the three program signals to the SA Output connector.
This SA Output is similar to the left channel of a User Station feed, except it does not carry dc and it is fully floating transformer-balanced. This output may be amplified and fed to a stage announce speaker, dressing room speaker or some other area. The program signal assigned to the SA output can be interrupted by a microphone signal from any of the control panels. Should a production not require a program feed to the stage, the program level control may be turned off, in which case only the microphone signal is heard.
When the SA function is used, one or two relays are activated inside the Central Electronics. Their contacts appear on the rear panel terminal strip and can be connected to a control room monitor amplifier input. They can be used to mute the local monitor speaker and prevent feedback when the SA is in use. In addition, internal programming jumpers may be configured to allow two separate areas of speaker muting, e.g., the audio booth Control Station SA function may be engaged, muting that local speaker only, and not affecting the production control room speaker.

*"SA" is also known as Studio Announce or Studio Address. A front-panel monitor section allows for selectable monitoring of any input or output signal via a stereo phone jack. A volume control and a selector switch affect only the monitor circuits and do not interfere with other functions.

Inside the Model 4010, a single large circuit board is used to mount all electronic components. A rear-panel terminal strip provides connections for the program inputs, IFB outputs, SA output, and relay contacts. Connection between the Control Stations and the Central Electronics is made through a 50-pin microribbon connector.

1.4 CONTROL STATION MODELS 4001, 4002, 4003 / 4001M, 4002M, 4003M

The Control Station is designed to mount in a console or equipment rack. It provides a given number of switch functions according to the model number. The 4001 offers IFB 1 thru IFB 4, IFB ALL and SA. The 4002 has IFB 1 thru IFB 8, IFB ALL, SA 1 and SA 2. Model 4003 supplies IFB 1 thru 12, IFB ALL, SA 1, SA 2 and SA 3. Each model number may be ordered with an "M" suffix. This refers to a gooseneck microphone attached to the panel. Should an existing microphone be more suitable for operations, a connection on the Control Station microphone preamp circuit board may be used to accept a microphone-level or line-level signal from that microphone.

Each Control Station is connected to the Central Electronics via a Model 4025 Splitter and 50-conductor cable with microribbon connectors. All the Control Stations converge at the 4025 and a single cable then connects to the 4010. This configuration allows up to four Model 4001 Control Stations to be connected to a single Central Electronics unit. When two Model 4010 Central Electronics units are used in an eight output configuration, the Model 4002 controls all outputs from up to four locations. Similarly, three Model 4010's and twelve outputs are controlled with a Model 4003, also in up to four locations. Priority of Control Station switch signals is programmable and may be set at the time of installation. The system may be used without priority switching if desired.

1.5 SPLITTER ASSEMBLY MODELS 4022 And 4025A

The splitter assemblies connect the control stations with the central electronics via 25-pair cable with microribbon connectors.

The Model 4022 features a single male connector paralleling two female connectors to connect two controls\ stations to the central electronics.

The Model 4025A features a single male connector with four female connectors for use with up to four control stations. All connectors are held securely in place with a snap-on cover housing.

1.6 SPECIAL OPTIONS

A return-send function may be incorporated with some small modifications. This feature allows the talent at the User Station to communicate with the Control Stations via a closed-circuit loop. This is done at the User Station by switching in an extra load, usually a lamp, across the feed to that station. Sensor circuits in the Central Electronics turn on relay-driving circuits, the outputs of which connect to a 9-pin miniature D connector on the rear panel. This allows an external relay to be used to transfer the announcer's microphone from the program line to a monitor amplifier or intercom in the control room. The person at the control station may now listen to the announcer without having the signal go over the air.

1.7.1 MODEL 4010 CENTRAL ELECTRONICS

Frequency Response	
30 Hz to 16 kHz	+1,-2 dB
Noise*	
Interrupt channel	-78 dBu
Non-interrupt channel	-83 dBu
Total Harmonic Distortion	0.5%
Nominal Input Level	
Microphone @ line level	-10 dBu/input Z=2k ohms
Program	0 dBu/input Z=2k ohms
Nominal Output Level	
To User Stations	-8 dBu/unbalanced, Z=10 ohms
To SA amplifier	-5 dBu/balanced, Z=800 ohms
Crosstalk	
From other program inputs	-67 dBu
Between left & right channels	-64 dBu
Dimensions/Weight	1.72"H x 19"W x 15"D 10.4 lbs. 43.7H x 215.9W x 381.OD mm 4.7kg
Mains Power	
Consumption	45 volt-amps
120/240 VAC, 50/60 Hz	

1.7.2 MODELS 4001/4001M, 4002/4002M, 4003/4003M

Frequency Response	
50 Hz to 16 kHz	+0, -3 dB
Signal-To-Noise Ratio	58 dB
Total Harmonic Distortion	0.2%
Nominal Input Level	
Microphone	123mV p-p
Line	-15 dBu to -5 dBu
Input Impedance	Unbalanced input
Microphone	470 ohms
Line	4.7k ohms
Gain	54 dB to 14 dB
Nominal Ouput Level	-10 dBu, balanced, Z=300 ohms

Size And Weight

4001/4001M	1.72"H x 8.5"W x 3.4"D 2.1 lbs./2.7 lbs 43.7H x 215.9W x 86.4D mm .953 kg/1.225 kg
4002/4002M	1.72"H x 12.25"W x 3, 4"D 2.3 lbs./2.9 lbs 43.7H x 311.2W x 86.4D mm 1.043 kg/1.32 kg
4003/4003M	1.72"H x 19.0"W x 3.4"D 2.4lbs./3.0 lbs 43.7H x 215.9W x 86.4D mm 1.089 kl/1.361 kg
Power Supply	2.0"H x 2.37"W x 2.62"D 1.4 lbs 50.8H x 60.33W x 66.68D 0.635 kg

Power Requirements

4001/4001M	14 VAC @ 200 mA
4002/4002M	14 VAC @ 450 mA
4003/4003M	14 VAC @ 1.0 amps

Specification Notes

* Ref: 0.5 V @ 1 kHz, measure at output terminal terminated into 600 ohms @ +10 dBV, 20 Hz to 20 kHz, average responding meter.

NOTE: All product information and specifications are subject to change without notice

SECTION 2: INSTALLATION

2.1 STANDARD INSTALLATION

The Central Electronics, Model 4010, is a rack mounted unit. **The rear of the Model 4010 must be supported with the brackets provided.** Installation dimensions and outline drawings for all components of the Series 4000 IFB System are located at the end of this manual. The Central Electronics, Model 4010, provides a rear panel terminal strip for connection to the Model 4020 User Stations. This is a low-impedance, line-level signal and may be sent over standard microphone cable or telco cable. The User Station will work at distances of up to 760 meters (2500 feet) with #22 cable. With an optional battery adapter, this range can be extended to 1500 meters (5000 feet). Connections for SA Output, SA relays, and Program Inputs, may be made at this terminal strip.

The Control Stations use either individual or common local AC power supplies. This allows the interconnect cables (to the Central Electronics) to remain signal-carrying only, avoiding the chance that a shorted cable might bring the entire system down. This local power supply provides power for the electronics and the switch lamps.

2.1.1 INPUT ELECTRICAL POWER (MAINS)

The standard Model 4010 IFB central electronics is designed to operate on 120 volts ac 10% at either 50 or 60 Hz. The 90 - 100 volt model is designed to operate at 96 volts ac 10%, 50 or 60 Hz. The 220-volt model operates on 220 volts ac 10%, 50 or 60 Hz. The 240-volt model operates on 240 volts ac 10%, 50 or 60 Hz. The series 4000 control stations require 12-14 volts ac or 16-20 volts dc. A wall mounted power module with an output of 12-14 volts ac at 1 amp is provided for this. Any external supply or transformer capable of supplying this may be used. The output connects to TB2, terminals 3 and 4 on the microphone preamplifier board of the control station. See figure 2-1.

2.1.2 CONFIGURATIONS

A standard interrupted feedback system can consist of one Model 4010 Central Electronics, four Model 4020 User Stations, one Model 4025 Splitter Assembly, and at least one Model 4001 Control Station. As many as four Control Stations may be used. See figure 2-2.

2.1.3 WIRE AND CABLE CONSIDERATIONS

The Control Stations are connected to the Central Electronics with 50-conductor ribbon cables, Model 4015-XX. The XX is the cable length in feet. These cables may be ordered in 5-foot increments from 5 feet to 100 feet. The maximum recomended cable length is 100 feet from any Control Station to the Central Electronics. The user stations are connected to the Central Electronics through standard two-conductor-plus-shield microphone cable (e.g. Belden #9451). A Smith #5209 spade-lug attaches to the rear-panel terminal strip. See figure 2-5.

The Stage Announce output is balanced and provides an average signal level of about -5 dBu. See figure 26. The program inputs accept balanced lines with a signal level of +4 to +8 dBu. See figure 2-6.

2.1.4 CONNECTION TO EXISTING MICRO-PHONES, "TW" TYPE USER STATIONS AND OTHER SOURCES

Any series 4000 Control Station can be connected to existing microphones (figures 2-7 and 2-8) and "TW" type user stations.A series 4000 Control Station can use the microphone in an existing "TW" type user station. Connect the UnSwitched Mic output (USM) from the "TW" user station to the line-level input on the Control Station. See figure 2-9. For connections to a Model 801 Master station, see Appendix C.

2.2 OPTIONS INSTALLATION

The design of the Series 4000 IFB system permits easy field installation and adjustment of the options and features discussed below. Options/features include priority control, speaker muting zones or areas, return IFB, expansion of the IFB "ALL" function andselection of monaural IFB (same signal-the

interrupted program-in both ears). The return IFB option requires additional equipment (see text below and Appendix A) to be supplied by the customer or to be custom-ordered from RTS Systems. The additional equipment would normally consist of relays to switch line-level microphone signals in a suitable junction box and a power supply for the relays. The relays are controlled from the Model 4010 Central Electronics unit. In addition, a modification to the Model 4020 for "TW" system type user station is required (see text below and Appendix B).

2.2.1 SETTING UP PRIORITY

The Model 4010 IFB Central Electronics, as supplied, has a priority arrangement by which one Control Station will override another. The priority of a Control Station is determined at the Control Station. By changing which plug (figure 2-10) goes to which jack on the Control Station's switchboard, the priority of that Control Station can be changed. See figures 2-11 through 2-13. If desired, the priority may be defeated by removing U6 and U16 in the Model 4010 Central Electronics. In this mode all Control Stations have equal priority. The priority override function works only with the IFB keys. The stage announce has no priority feature. The signals are merely mixed together should two Control Stations be keyed simultaneously.

2.2.2 SETTING UP SPEAKER MUTING ZONES

Two sets of relay contacts are provided at the back panel of the 4010 Central Electronics for area control of speaker muting. These relays work in conjunction with the Stage Announce (SA) buttons on the Control Stations. This permits, for example, the audio operator to use the SA without interrupting the director's program monitor speaker and vice versa. By cutting out the resistors shown in fiugre 2-14 the relay will be deactivated for that station. The station numbers are determined by their priority selection (see section 2.2.1, Setting Up Priority). Station 1 has priority 1, station 2 has priority 2, etc. Normally, with all resistors intact, both relays work when an SA button is pressed on any Control Station.

2.2.3 RETURN IFB INSTALLATIONS

A return-send function may be incorporated with some small modifications (see figure 2-15). This feature allows the talent at the User Station to communicate with the Control Stations via a closed-circuit loop. This is done at the User Station by switching in an extra load, usually a lamp, across the feed to that station. A sensor circuit in the Central Electronics turns on a transistor whose collector terminal appears open ended at a 9-pin miniature D connector on the rear panel. This allows a relay to be used to transfer the announcer's microphone from the program line to a monitor amplifier in the control room. The person at the Control Station may now listen to the announcer without the signal going over the air. The output through the miniature D connector is capable of operating a 12- to 24-volt relay at up to 50 milliamps. The relay will trigger when 60 milliamps to 200 milliamps is drawn from the line. The exact value is set by R4 for channel 1, R33 for channel 2, R62 for channel 3, and R91 for channel 4. See figure 2-15. To trigger the relay, switch a 12-volt 90 milliamp lamp across the 12 volts in the user station. **Note:** Only one user station per output may be used when the return option is used.

2.2.4 EXPANDING THE CONTROL STATION'S ALL FUNCTION

The "IFB ALL" button on the Control Station causes all of the IFB buttons to be activated. The "SA" button is not activated. To make the SA work with the IFB ALL button, add the following diodes.

MODEL:	DIODE(S):
4001(M)	D25
4002(M)	D56, D61
4003(M)	D100, D105, D110

2.2.5 MONO IFB

When the switches inside the 4010 Central Electronics are switched to the right, both left and right channels at the user station will receive the interrupted program feed. See figure 2-16.

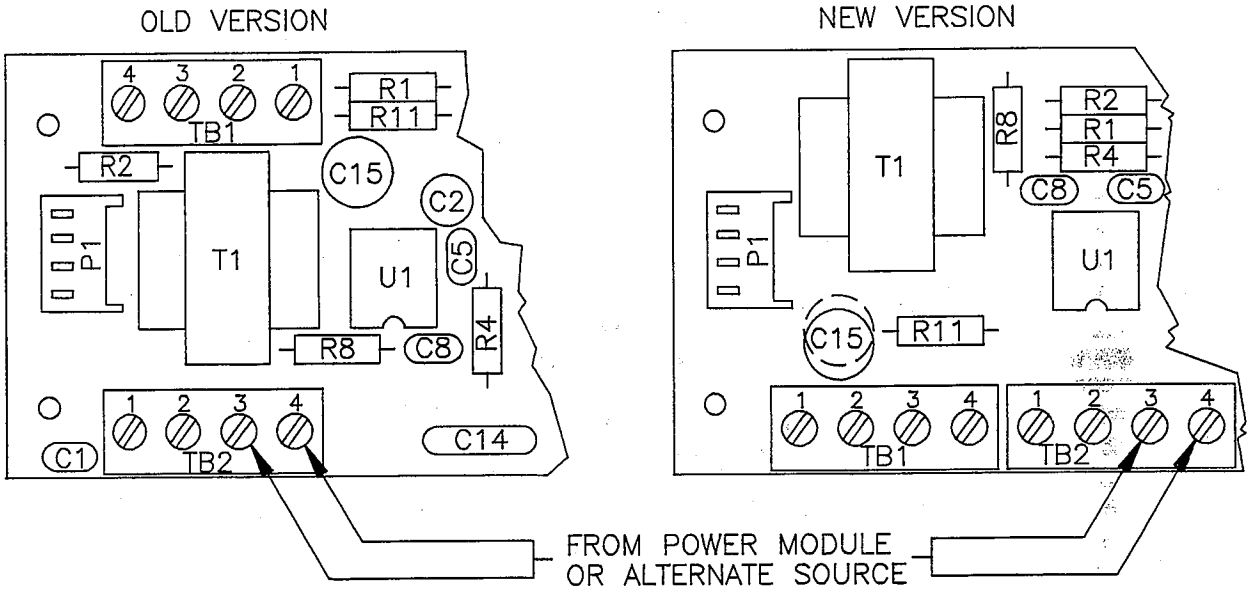


Figure 2-1
Power Connection To Series 4000 Control Stations

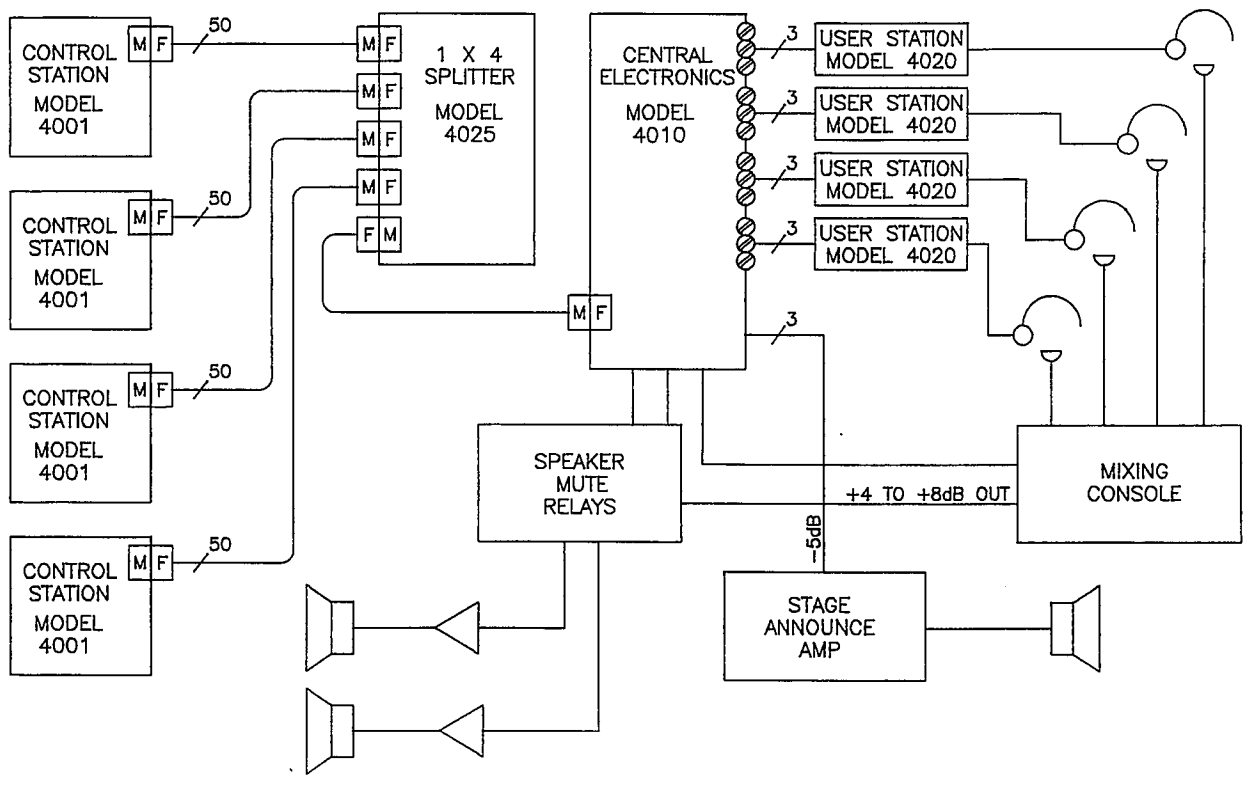


Figure 2-2
A Typical Configuration

The system may be expanded for up to twelve User Stations, three Central Electronics, three Splitter Assemblies and four Control Stations. See figures 23 and 2-4.

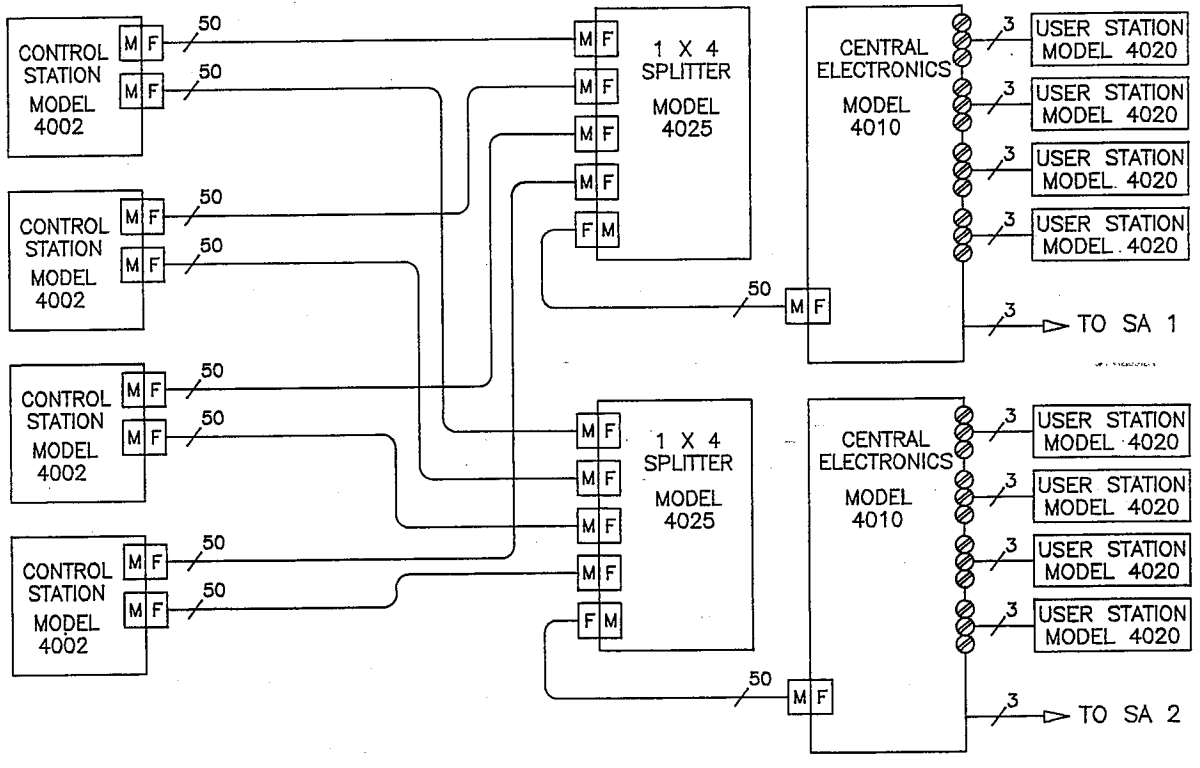


Figure 2-3
A Configuration-2 System

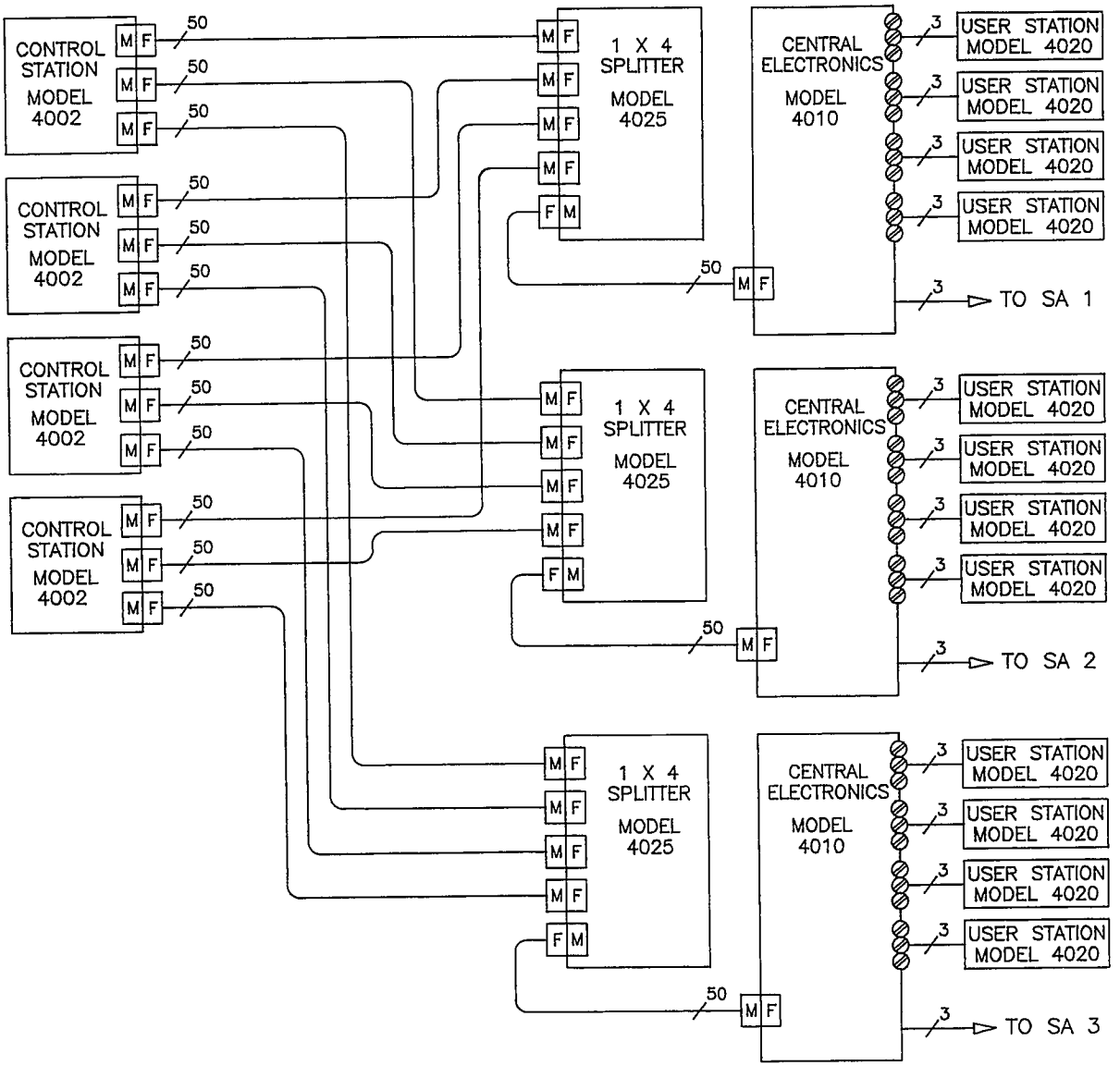


Figure 2-4
A Configuration-3 System

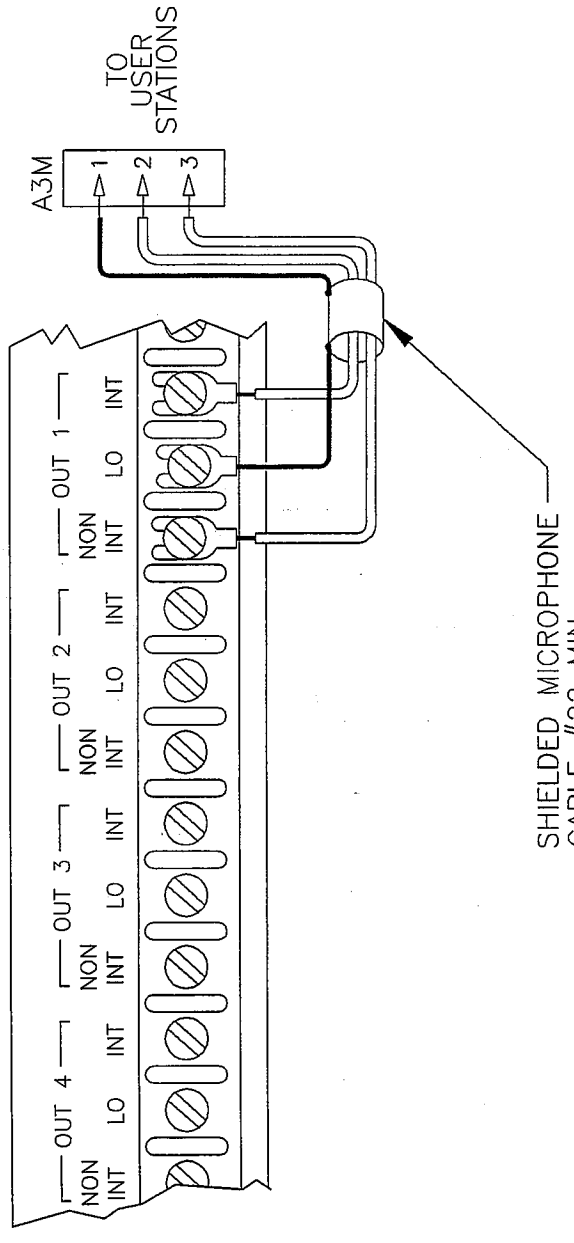


Figure 2-5 (Revised 20 February 1991)
User Station Connection To The 4010

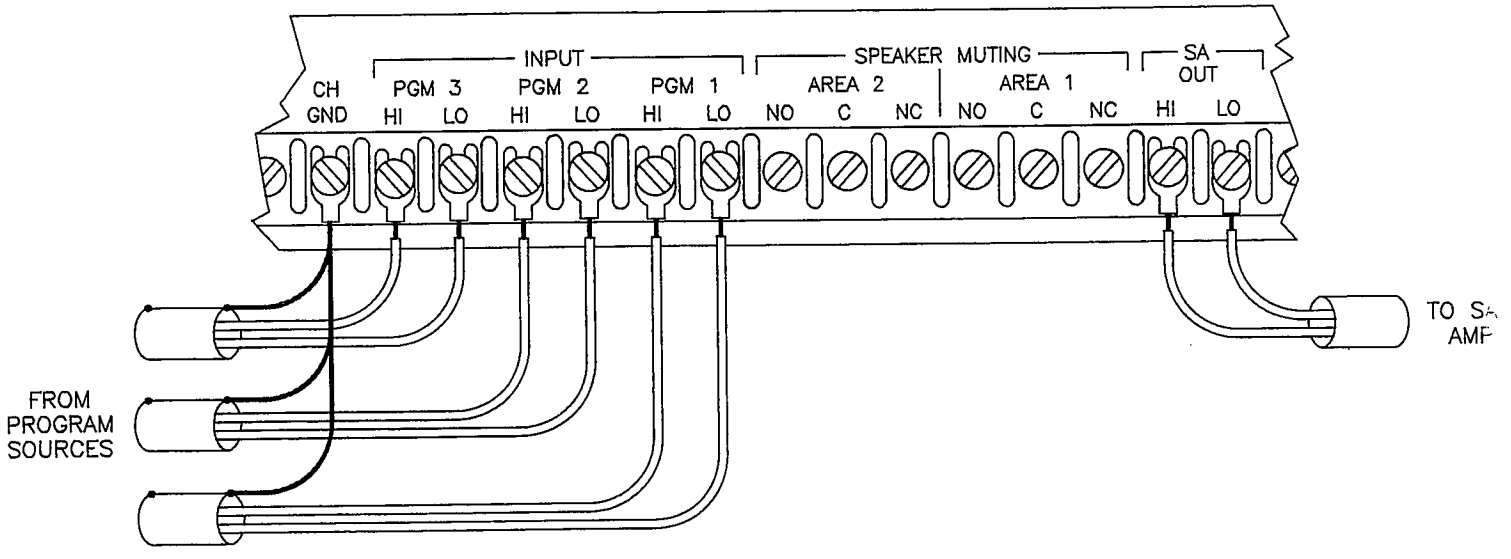


Figure 2-6
Program Input And SA Output Connections

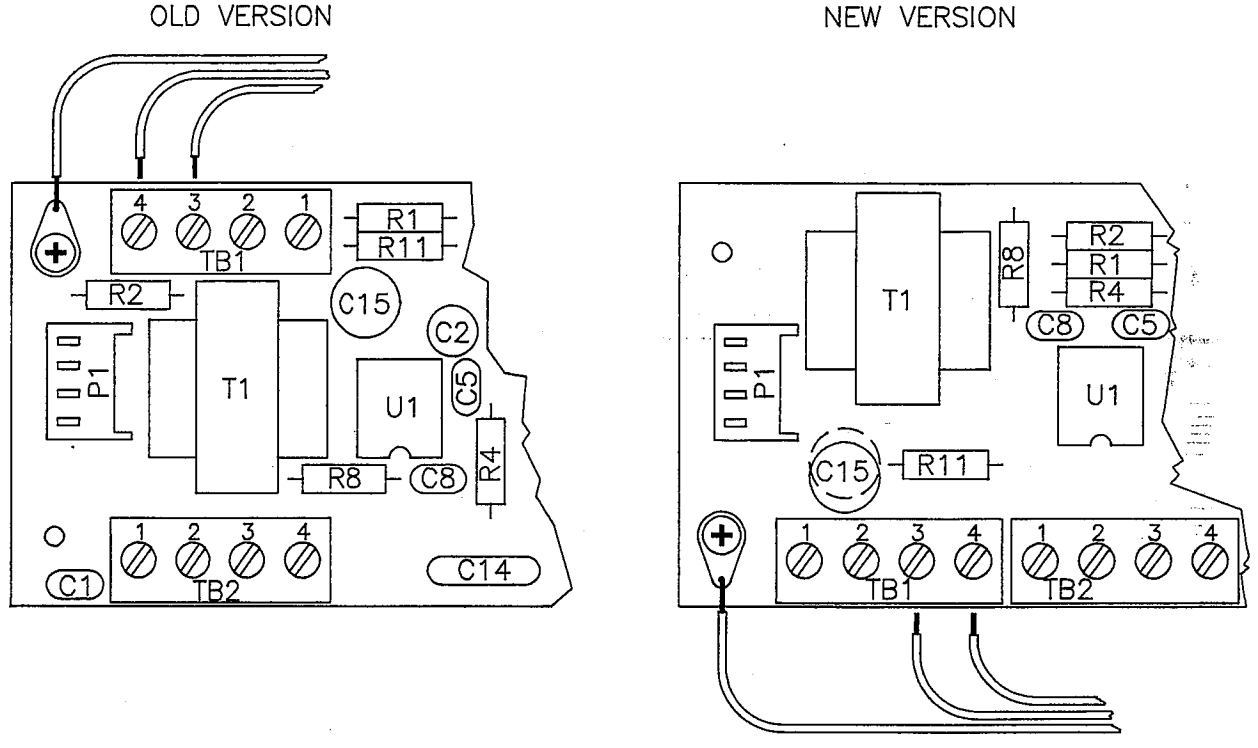


Figure 2-7
Balanced Mic Level Input

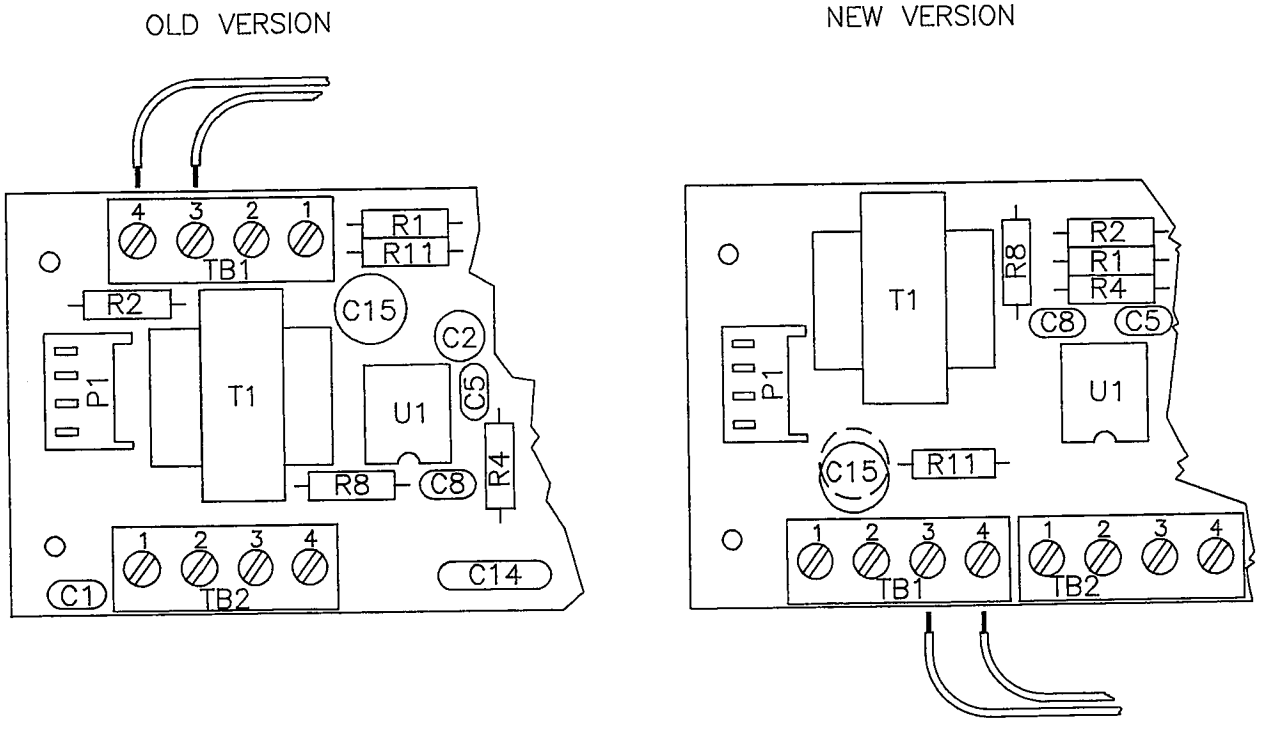


Figure 2-8
Unbalanced Mic Level Input

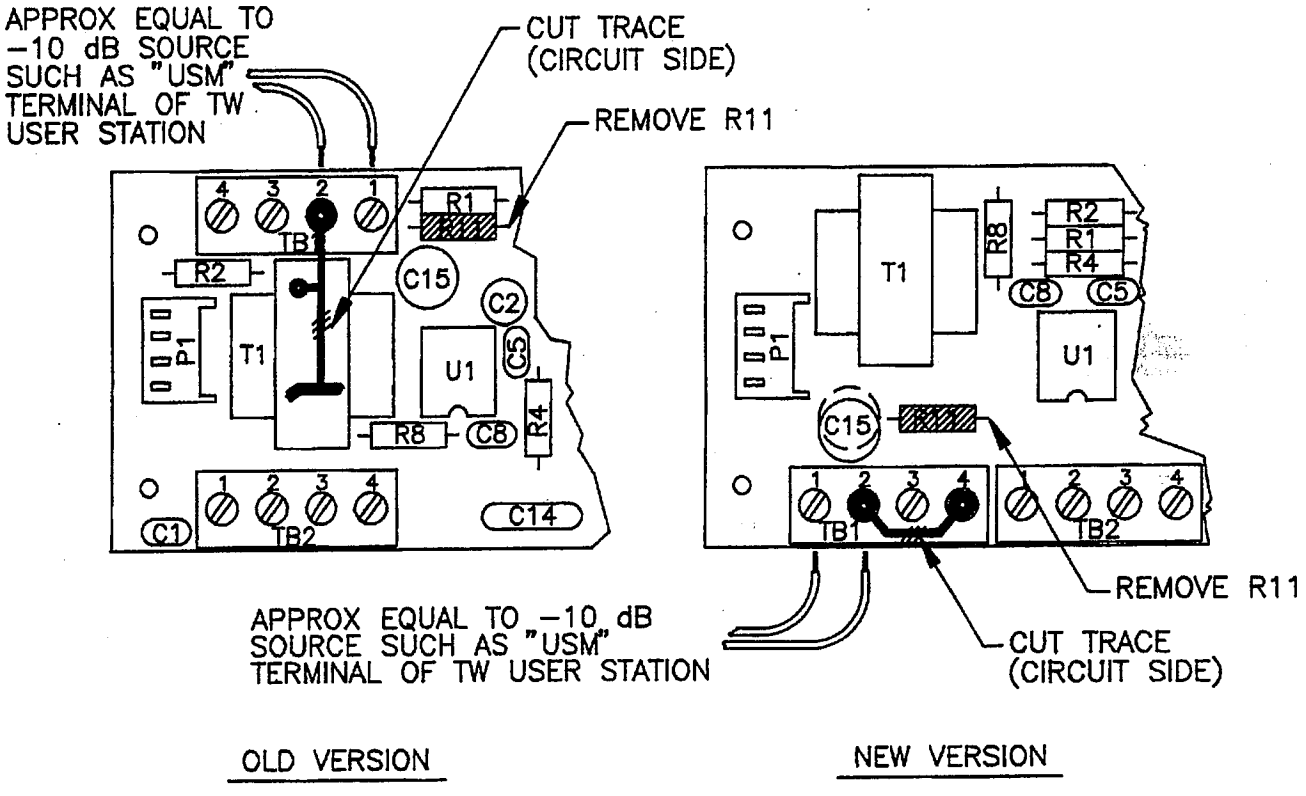


Figure 2-9
Line Level Input

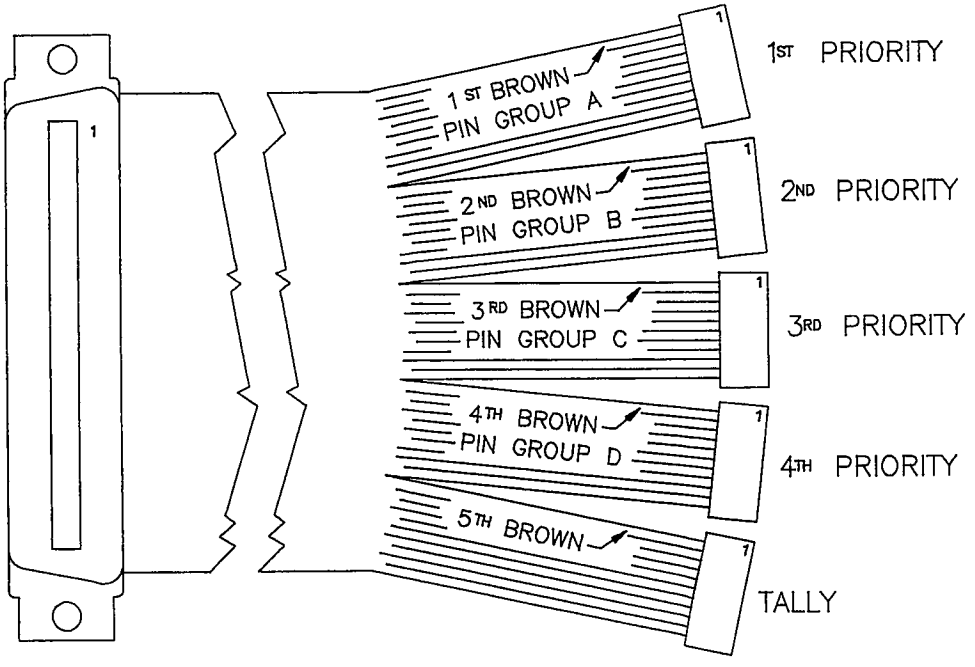


Figure 2-10
Control Station Cable Assembly

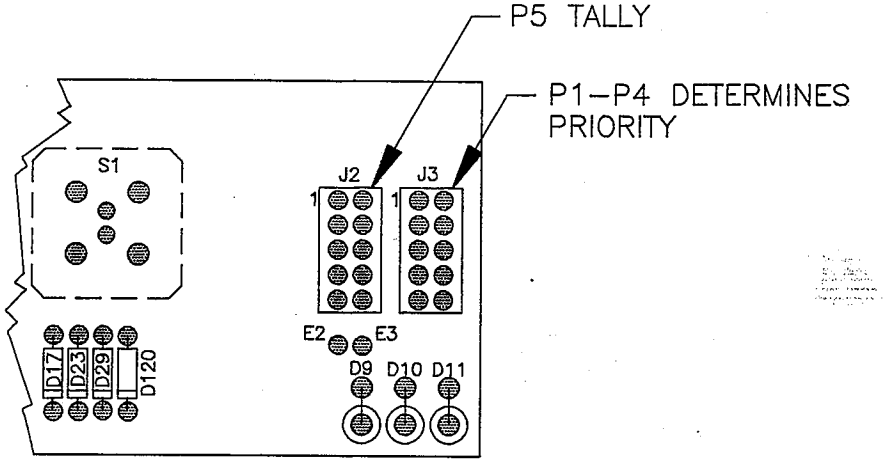


Figure 2-11
Priority Connections To 4001 Control Station

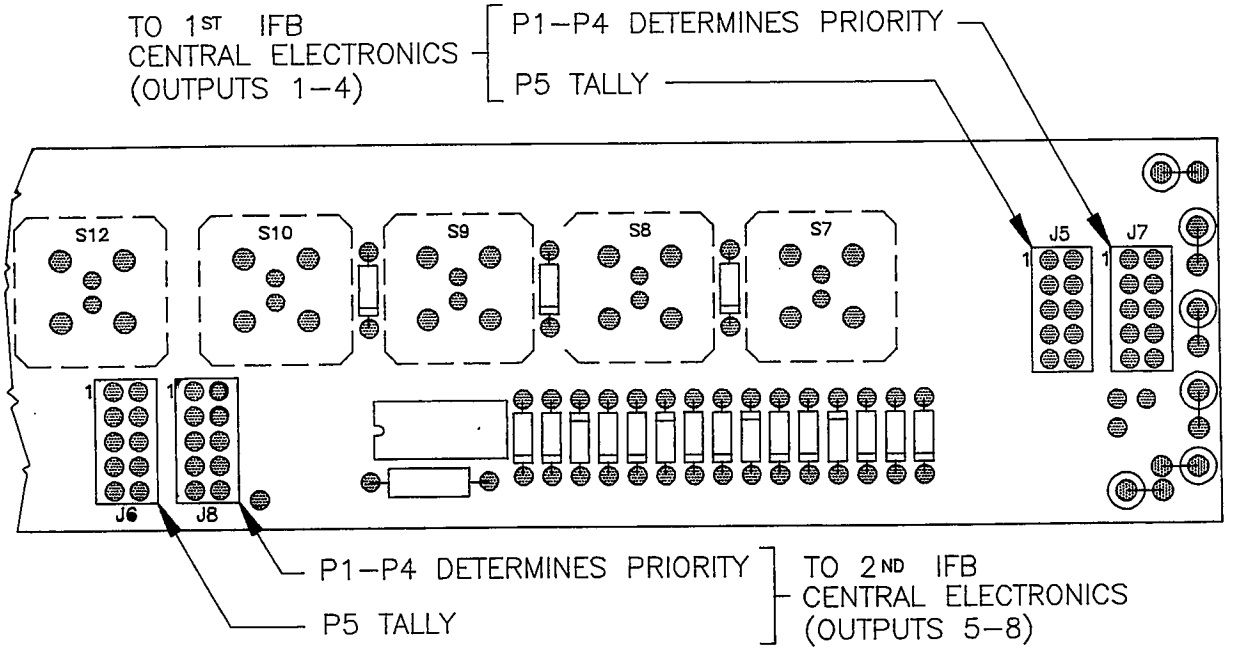


Figure 2-12
Priority Connections For 4002 Control Station

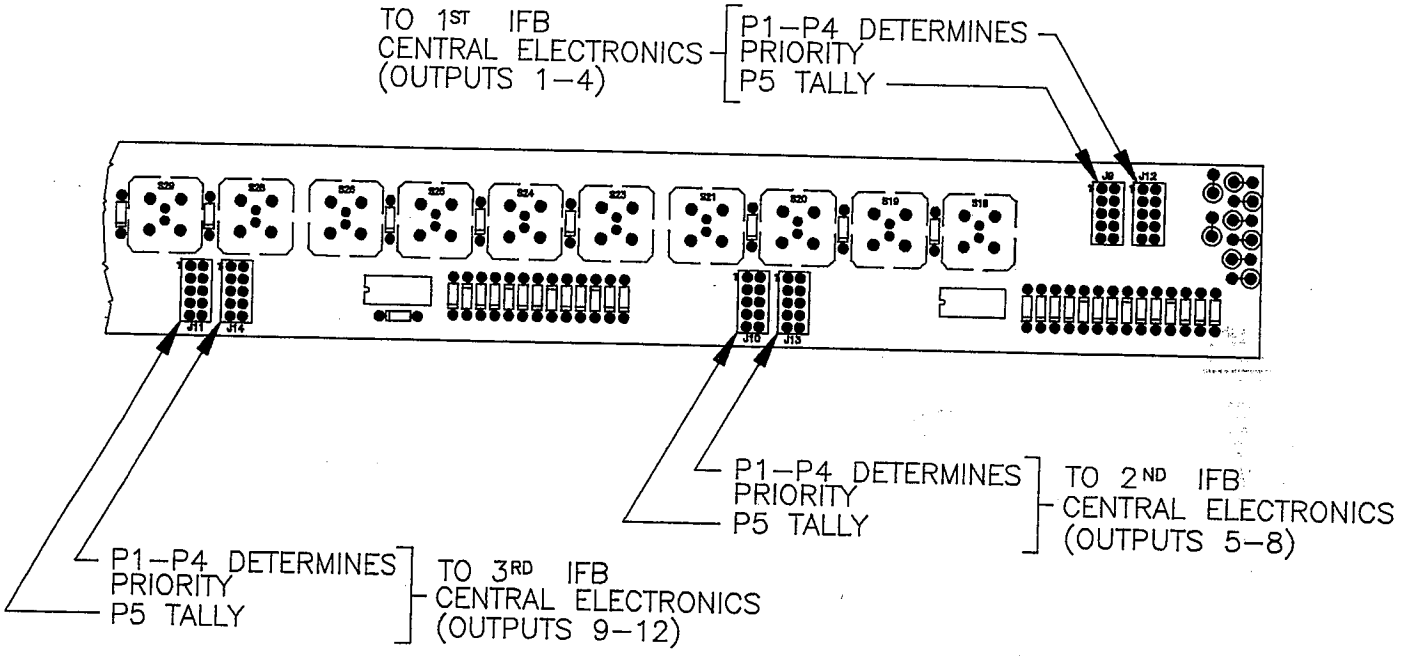
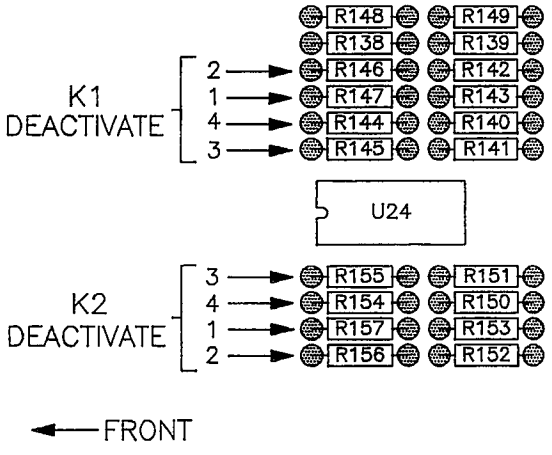


Figure 2-13
Priority Connections For 4003 Control Station



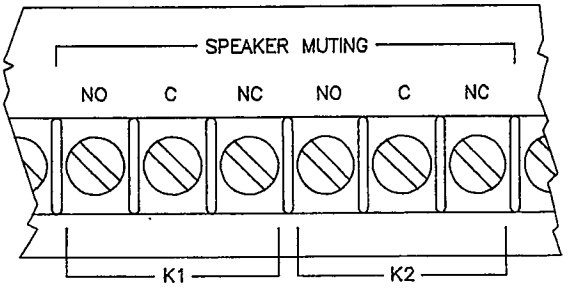


Figure 2-14
Speaker Muting Zones

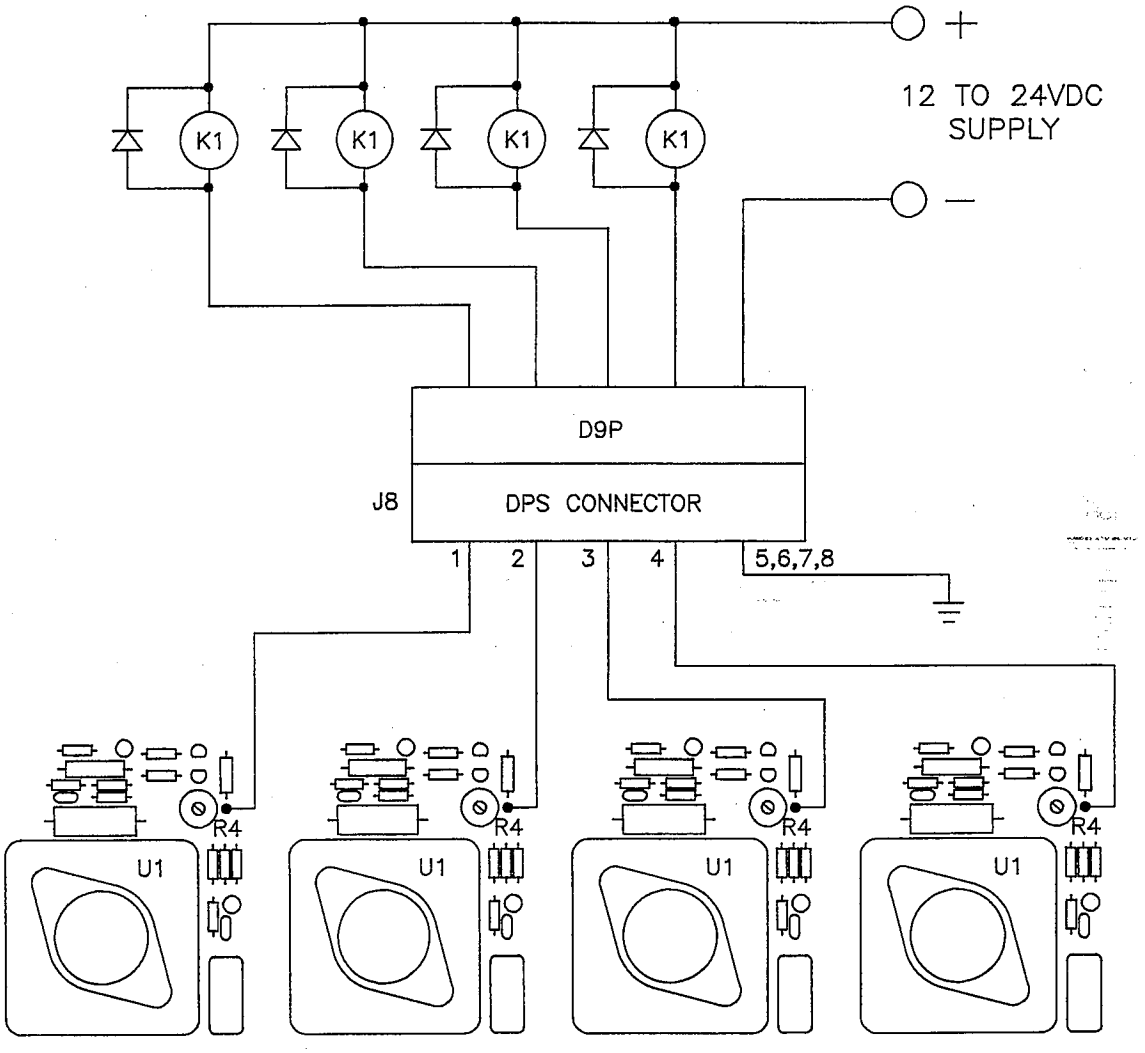
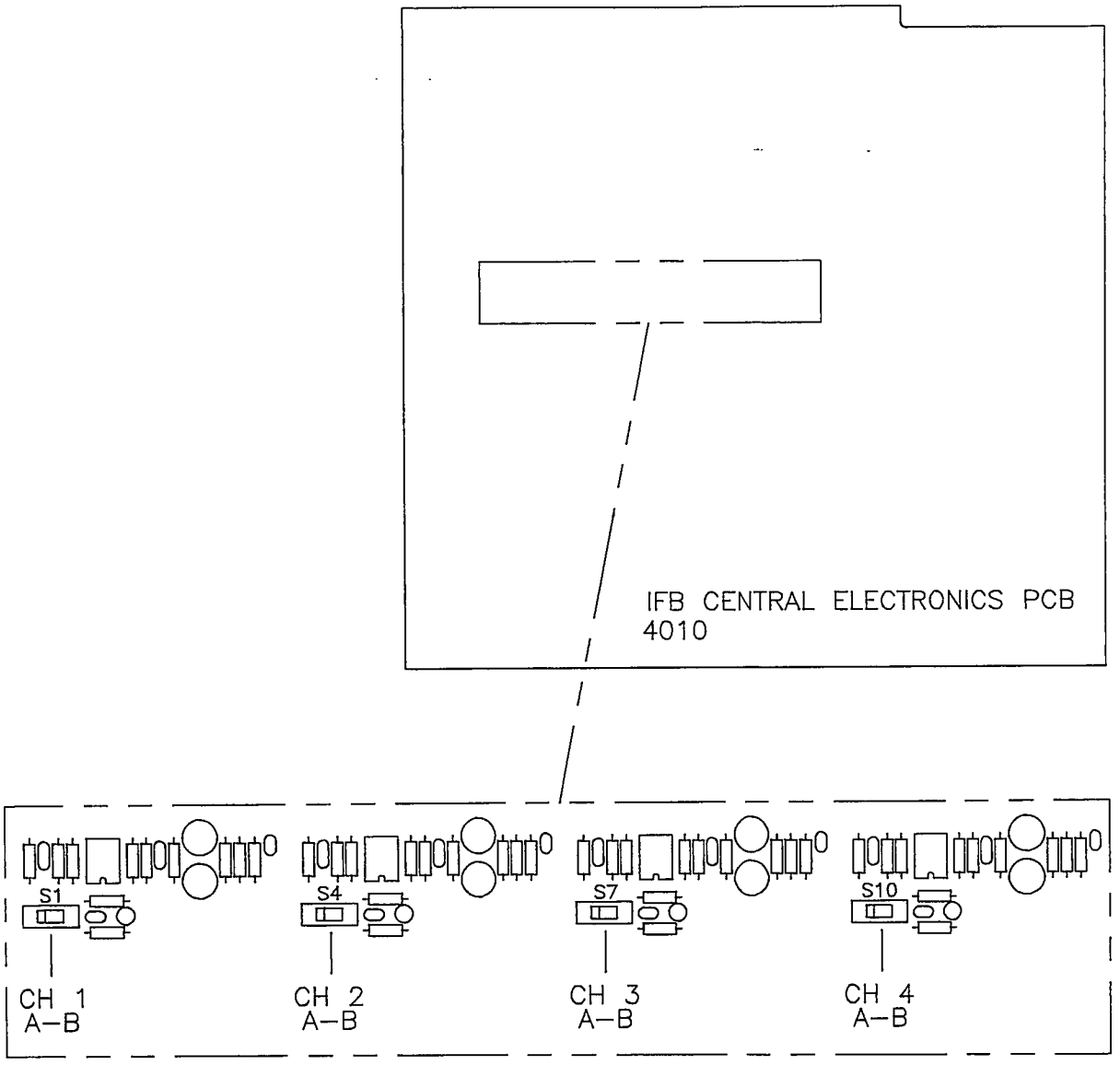


Figure 2-15
Return IFB Connections



A = ONE OUTPUT: INTERUPT; ONE OUTPUT: NON–INTERUPT
B = BOTH OUTPUTS: INTERUPT (CONTROLLED BY INTERUPT SWITCH AND LEVEL)

Figure 2-16
Stereo-Mono IFB Selection

SECTION 3: OPERATING INSTRUCTIONS

3.1 INTRODUCTION

The Series 4000 IFB System is very easy to use. The discussion below covers initial setup as well as the actual operation of the equipment. Field setup and connection of the Model 4020 User Station vary considerably depending on your needs and on the physical configuration of the studio, truck, arena, theatre, golf course, etc. you have to equip. The basics for Model 4020 setup are discussed in sections 3.4 through 3.7 below.

3.2 SETUP AND OPERATION OF THE CENTRAL ELECTRONICS, MODEL 4010

After you have made all connections, plug a stereo headset into the test jack on the front panel of the model 4010. With program playing into program input 1, turn the monitor switch to PGM 1 and verify program. Then check programs 2 and 3. **Caution:** the program level is louder than the mic monitor and the output monitor levels. To set program level to the User Stations, turn the monitor selector switch to OUT 1. Set program-select switches under OUTPUT 1 to the desired channels. Set the program level to its midpoint. Have someone depress an IFB 1 button on a Control Station and speak into the microphone. Compare the interrupt level with the program level and adjust program levels as needed for a balance between the program and interrupt audio. Repeat this procedure for the remaining outputs. When the monitor-select switch is in the SA position, the left headphone recieves the SA program before it is interrupted. The right headphone recieves SA audio after the interrupt switch.

3.3 CONTROL STATION OPERATION MODELS 4001,4001M,4002,4002M,4003,4003M

To use a Control Station, press the button or buttons of the channel(s) you wish to interrupt and speak into the microphone.

3.4 USER STATION OPERATION, MODEL 4020

Connect the User Station to the Central Electronics via the 3-pin XLR-3 connector on the rear of the User Station. Polarity and correct connections are important for proper operation. To save time, check the connections to make sure that pin 1 is common and pin 2 has the +28 volts dc on it with respect to pin 1. In three-wire operations, pin 3 will have only the uninterrupted audio on it and no dc. In two-wire operation, it is absolutely essential that pin 2 carry the dc (positive) and that pin 1 be the common or return (negative). Plug a pair of stereo headphones into the stereo headphone jack on the rear of the Model 4020 User Station. Adjust headphone levels as desired. The volume controls are made so that they cannot be turned all the way down, to prevent someone from missing a cue.

When using a single earplug, plug its cord into the mono headphone jack. This jack provides the interrupted audio. Use this jack when plugging a speaker into the Model 4020.

User Stations may be paralleled with our TW-4W or similar splitter box. The Central Electronics will power up to three User Stations per output.

3.5 SUBSTITUTING "TW" INTERCOM STATIONS FOR IFB USER STATIONS

Any RTS "TW" intercom station may be substituted for a 4020 User Station. The BP-501 User Stations will provide stereo IFB. Any other User Station should have the channel-select switch set to channel 1 to receive the interrupted monaural audio. A "TW" User Station with the Local Power (LP) option can be used to operate on a dry pair IFB feed providing long distance operation up to 8 kilometers (5 miles) with stepup and stepdown transformers. See figure 3-1.

3.6 OPERATING WITH TELCO DRY PAIR(S)

The 4020 User Station can be operated on one "dry" telco pair. Just attach common and the interrupted output to pins 1 and 2 respectively on the XL connector going to the User Station. For long distances, where hum is a problem, the 4020 can be operated on two telco pairs in stereo with one of our Balanced/Unbalanced converters at each end.

3.7 OPERATING DISTANCES

With a telco pair, maximum operating distance will average 800 meters (1/2 mile). Doubling up the conductors in a telephone quad will extend the operating range to 1600 meters (1 mile). Utilizing an extra power supply and transformers, the range can be extended to 8 kilometers (5 miles) on telco dry pair. See figure 3-1.

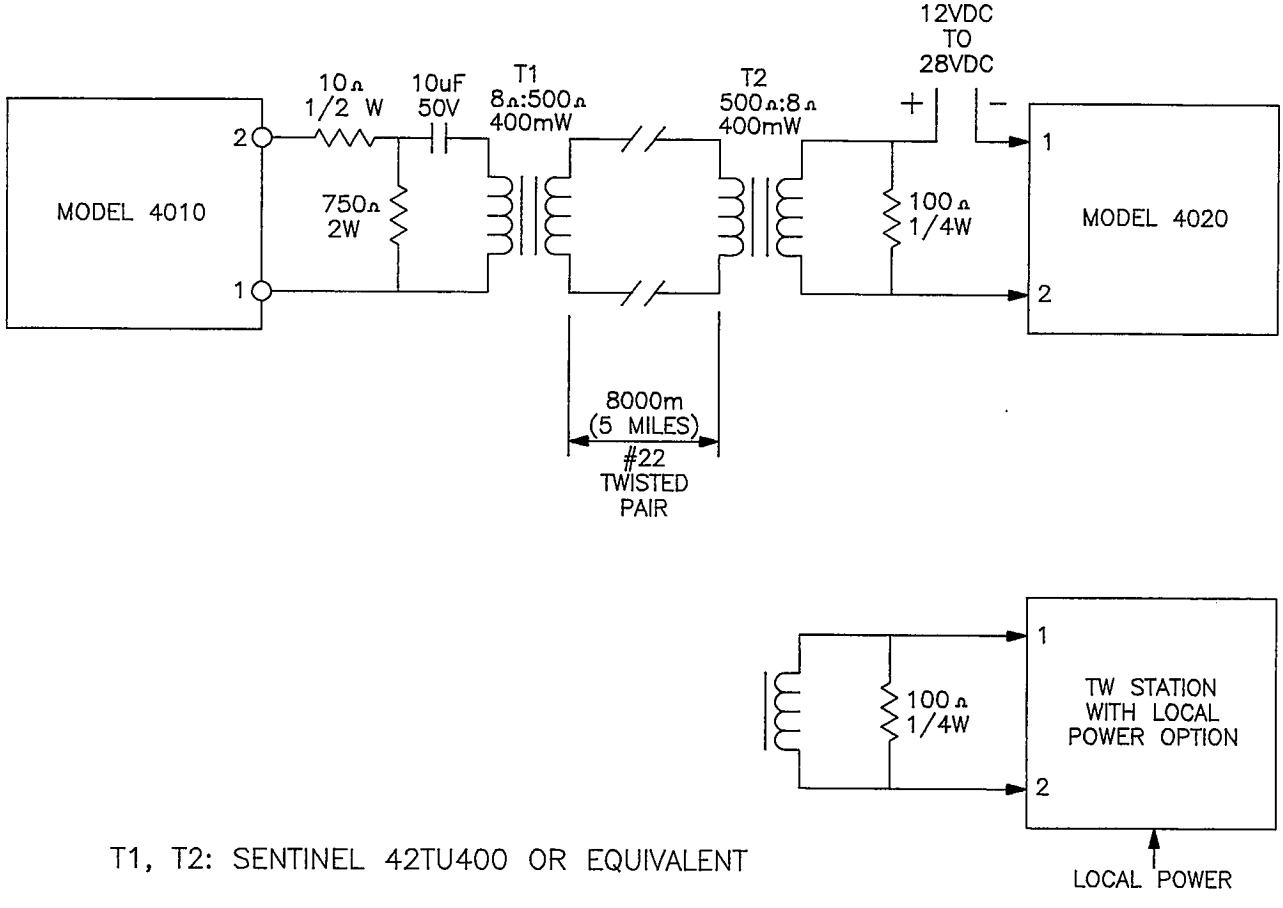


Figure 3-1
Range Extender

SECTION 4: THEORY OF OPERATION

4.1 INTRODUCTION

The Series 4000 IFB system is designed to overcome several disadvantages of older conventional systems. Older systems consist of microphones, preamps, Control Stations, power amps, relays, power supplies, and high-power audio transformers. The Series 4000 system consists of microphones, preamps, Control Stations and a small Central Electronics. The Central Electronics contains logic, electronic audio switches, dc power drivers that superimpose audio on the dc, and a built-in power supply. Older systems drive high-power audio down the lines to the users, often crosstalking into adjacent microphone cables. The Series 4000 IFB system superimposes line-level audio on dc. Neither the line-level audio nor the dc crosstalks into the other cables. The dc supplies power at the IFB user end to run a small power amplifier at the user's location. The advanced design of the Series 4000 system then offers the following advantages over older designs:

No crosstalk
Reduced weight
Reduced size
Reduced energy requirements
Reduced air conditioning load
Reliable and quiet electronic switching

4.2 OVERALL FUNCTIONAL DESCRIPTION

The series 4000 IFB system consists of three major components: Control Station, Central Electronics, and User Station. The Control Station connects to the Central Electronics through a 50-conductor ribbon cable. The User Stations can connect to the Central Electronics by microphone cables with XLR connectors at the User Station and a terminal strip at the Central Electronics. When IFB button S5 in figure 4-1 is pressed at the Control Station a control line to the Central Electronics is grounded. D116 is pulled low, pulling the tally line to other Control Stations low. D19 is also pulled down, causing lamp DS2 to go to full brightness. Audio is fed through another pole of switch S5 to the Central Electronics. The control signal causes the electronic switch in the Central Electronics to switch from program to the audio from the Control Station. Output from the switch is fed to a buffer amp and ac/dc driver which adds the audio to 29 volts dc. This signal passes through the microphone cable to the User Station. At the User Station a regulator takes power from the combined audio and dc line to operate the headphone amplifiers. The headphone amplifiers take the line level audio from the Central Electronics and amplify it to drive headphones.

4.3 CENTRAL ELECTRONICS FUNCTIONAL DESCRIPTION

POWER SUPPLY

The power supply consists of T9, T10, and T11 (schematic diagram SD1914), each rated at 10 volts rms. The 10 volts ac of each transformer is rectified by full-wave bridge rectifiers consisting of diodes D73 - D84. C65 - C67 provide filtering. C83 - C94 prevent D73 - D84 from causing radio frequency interference. The outputs of these three separate supplies are connected in series to provide 13 volts, 26 volts, and + 40 volts dc. D85 - D87 provide polarity-reversal protection to the filter capacitors should any of the supply rails be shorted. U29 provides current limiting to the 40-volt supply.

U33 (schematic upper right) provides 20.5 volts dc to power the op amps.

U32 (bottom center) provides 12 volts dc to bias the op amps

U30 (bottom right) provides 12 volts dc to power the CMOS electronic switches and the other digital IC's.

U31 (top left) provides 12 volts dc to power the monitor headphone amplifiers.

D108 with {of U21 (center right) provide 6 volts dc to bias the program buses for the CMOS switches.

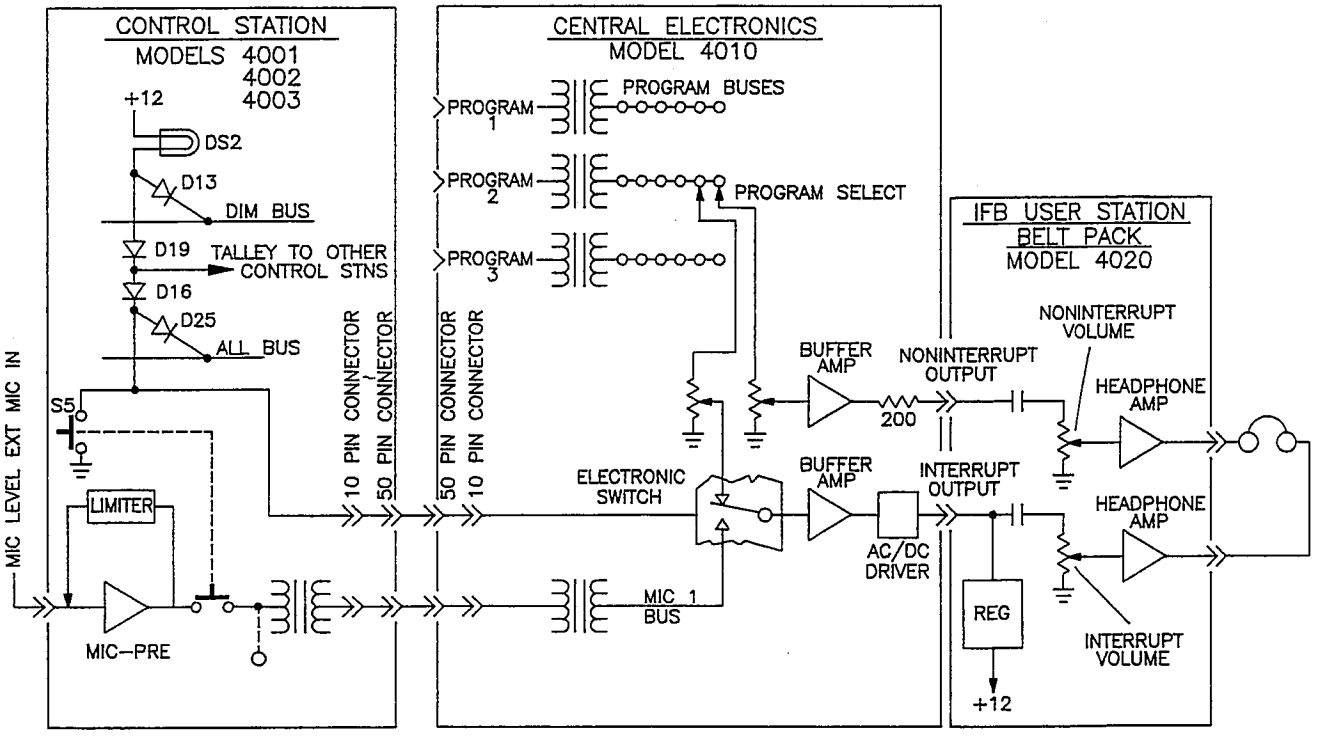


Figure 4-1
Line Diagram, Series 4000 IFB System

PROGRAM AUDIO INPUT

The program enters at the rear terminal strip through resistors R241 - R246, R158 - R160, a bridging pad, and T2 - T4. These transformers convert the balanced audio to unbalanced audio for switching. The unbalanced program is then coupled to the program buses through C80 - C82. The buses are biased at 6 volts dc with R229 - R231 to allow an audio signal of up to 12 volts peak to peak to pass through the CMOS switches without distortion.

CONTROL STATION AUDIO INPUT

The Control Station balanced line-level microphone audio enters the unit through T5 - T8 where it is unbalanced and fed to four "mic" buses. This will be refered to as the "mic" signal. For channel 1, interrupted side, program passes through S2 to R16A, the program level control. "Program" is the audio that enters through the rear-panel terminal strip and transformers T2 - T4. From there it passes through R13, the CMOS switch (U3), R10, and C5 to the input of the summing amp { U2. From there the audio is coupled through C3 to the adjust terminal of voltage regulator U1. This causes the audio signal to be added to the 29 volts dc at the output of U1.

The noninterrupted audio passes through program select switch S3, front panel level control R16B, internal mono-stereo switch S1, and the buffer amp, the second half of U2.

INTERRUPTING

When the IFB 1 switch in Control Station number one is pressed, D51 is brought low. This pulls pin 9 of U3 low causing switch C to switch from audio ground to the MIC 1 bus. Pin 10 of nand gate U5 is also pulled low causing pin 13 to go high and switch B to disconnect the program. Pin 14 of inverter U6 is pulled low causing pin 15 to go high, thus inhibiting the lower priority stations through D27 - D29.

AC/DC LINE DRIVER

R5 is the current-limit sense resistor. When the drop across R5 is greater than 1.9 volts, the adjust terminal of U1 is pulled low, keeping the output dc (through R5) equal to or less than 200 milliamps.

TALKBACK IFB SENSE

The setting of R4 determines the current at which the talkback relay trips. When the voltage between the emitter and base of Q1 is greater than 0.6 volt, Q1 conducts, pulling the base of Q7 up. This causes Q7 to conduct and energize the coil of the external talkback relay.

SPEAKER MUTE

When the SA button on Control Station number 1 is pressed, D67 (lower right) is pulled low, pulling pins 11 and 3 of U24 low. This causes pin 13 and 1 to go high, turning on Q5 and Q6, and energizing K1 and K2. If, for example, R147 is cut out, then Q5 and K1 will not be activated from Control Station number 1.

STEREO MONITOR HEADPHONE AMP

S14 (upper left) selects which program is heard in the test headset. The 7307 power amplifiers (U25 and U26) have a gain of 50 and can supply an output power of 1 watt but are limited to about { watt by the 10 ohm resistor.

4.4 CONTROL STATION FUNCTIONAL DESCRIPTION

POWER SUPPLY

14 volts ac is supplied from a wall-mount transformer through TB2 (schematic SD2043) and is rectified by a full-wave bridge rectifier consisting of diodes D3 - D6. C10 and C11 provide filtering. U2 provides current limiting by sensing the voltage drop across R12. The current limit is set at 250 milliamps for the Model 4001, 570 milliamps for the Model 4002 and 1.3 amps for the Model 4003. FET Q2 provides a constant current at high isolation to zener diode D8 which gives 4.7 volts to bias the op amps.

MIC-PRE & LIMITER

The signal from the microphone enters the microphone preamplifier through TB1, terminals 3 and 4, where it is amplified by U1. The minimum gain (27 dB) of U1 is set by R7 and R5. The maximum gain is set by R7 and Q1 and is approximately 54 dB.

The limiter senses the output level of U1 through R10. C9 rolls off frequencies above 700 Hz so that the limiter is less affected by clicks and pops. Trim pot R9 sets the threshold of the limiter. C6, D1, and D2 form a voltage doubler circuit that charges C3 with a negative voltage that varies with the output level of U1. This negative control voltage is fed to the gate of Q1. The stronger the signal is, the more negative the gate of Q1 is. This causes Q1 to turn off and it's resistance to go high. This allows more feedback to reach the negative input of U1 thus reducing the gain of the circuit.

The output of U1 is fed to one side of T1, C15 is normally connected to the centertap. The balanced audio output is fed through P1 to the switch board.

4001 SWITCH BOARD

The audio is received through J1. When any button is pressed, the switch is closed and the audio passes through to J3, pins 7 and 8.

All switches are illuminated so that legends may be read in a darkened room. The illumination is of a two level type, bright when the button is depressed and dim otherwise. Diodes D9, D10, and D11 make a 7 volt rail that is the low brightness sink for the lamps. When IFB1 is pressed, D120 and pin 1 of J3 are pulled low. J3 pin 1 sends the control signal back to the Central Electronics. D120 pulls J2 pin 1 low. J2 pin 1 is the tally signal to the other Control Stations. D23 pulls lamp DS6 low turning it fully on.

When the IFB ALL button is pressed D24, and D26 - D29 are pulled low. D26 - D29 pull all the IFB signal lines low as if all the buttons had been pressed. This turns the lights on bright, sends tally signals to other Control Stations, and sends control signals to the Central Electronics for IFB1 - IFB4. D25 causes the SA function to work when the IFB all button is pressed.

D116 - D120 prevent another station's tally signal from triggering this station's control to the Central Electronics. D18 - D23 prevent one station from sinking all the low lamp level bus current. D12 - D17 power the lights on dim.

4002 SWITCH BOARD

The 4002 switch board is just like two 4001 switch boards put together. The only difference is that there is only one IFB ALL button on the 4002. The audio to the first Central Electronics is switched by K1 when the IFB ALL button is pressed. K1 isolates the two Central Electronics, preventing a hum loop from being developed.

4003 SWITCH BOARD

The 4003 switch board is similar to three 4001 switch boards put together except that there is only one IFB all button. The audio to Central Electronics one and two is switched by K2 and K3 when IFB ALL is pressed. K2 and K3 isolate the three Central Electronics and prevent hum loops from being developed.

4.5 USER STATION FUNCTIONAL DESCRIPTION

The 4020 User Station consists of two headphone amplifiers and a regulator that has a high input impedance. The high input impedance reduces audio line losses and, in addition, allows the 4020 User Station to be used as a dual channel listen only station on the "TW" intercom system.

POWER SUPPLY

The dc and interrupted audio enters on pin two of the rear panel XL connector (schematic SD1905) and passes through D1 which provides reverse current protection. The output of VR1 is set for 13 volts by R6 and R7. C8 slows down the current response of VR1. This keeps the input to VR1 a high impedance. C12 and C15 provide filtering.

AMPLIFIER

The interrupted signal is coupled by C11 and fed to front panel level control R10. This is fed to power amplifier IC U2. This IC has a gain of 50 and can supply an output power of { watt (via a 10 ohm safety resistor). The non-interrupted input is coupled by C1 to front panel level control R1 and amplified by U1. The outputs from both amplifiers are made available through }" phone jacks on the rear panel.

4.6 RETURN IFB FUNCTIONAL DESCRIPTION

The return IFB function is activated by adding an additional load at the User Station. This is accomplished by switching a number 73 lamp across the 12 volt supply in the User Station. This extra load is sensed in the Central Electronics by R5, for channel 1. The setting of R4 determines the current at which the talkback relay trips. When the voltage across the emitter and base of Q1 is greater than 0.6 volts, Q1 conducts, pulling the base of Q7 up. This causes Q7 to conduct and energize the coil of the external talkback relay. The external relay is then used to switch the microphone associated with that User Station from the mixing console to a separate amplifier and speaker near the director. See also section 2.2.3.

SECTION 5: MAINTENANCE

5.1 INTRODUCTION

The Series 4000 IFB system should require no preventative maintenance other than an occasional cleaning and performance check.

5.2 SERVICE INFORMATION

The RTS System Series 4000 IFB system's components are warranted for a period of three years from the purchase date. The warranty is located at the front of the book.

5.3 GENERAL MAINTENANCE

WARNING

THE FOLLOWING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRIC SHOCK, DO NOT ACCESS THE INTERNAL SWITCHES, JUMPERS OR FUSE UNLESS YOU ARE QUALIFIED TO DO SO.

WARNING

DISCONNECT AC POWER BEFORE SERVICING.

To get inside the 4010 Central Electronics, lift the back edge of the top cover and pull back. The cover will then slide out. The bottom cover comes off the same way.

To get inside the 4020 User Station, remove the knob covers and then the knobs. Remove the nuts holding the pots to the front panel. Turn the unit over and remove the four screws holding the back panel. Now pull the back off, and the circuit card will slide out also. To remove the switch covers on the control stations, remove the control station from the panel in which it is installed. With a small screwdriver, pry the amber tab of the switchcover away from the switch body. Pull gently forward on the switch cover. Do not force the switch as it will break. See figure 5-1.

5.3.1 INPUT POWER SELECTION

The Model 4010 is designed to operate on 50 or 60 Hz, 120 volts ac ± 10% with the jumpers as in figure 5-2A. By moving the jumpers, between T10 and T11, it may be converted to 220-240 volts ac ± 10% operation (figure 5-2B).

5.3.2 CLEANING

Clean the front panels and the cases of the Series 4000 components with denatured alcohol or a mild solution of detergent and water. Clean the interiors of the units with dry, low pressure air. The circuit board can be cleaned with any good quality electronic cleaning solvent. Avoid getting the solvent in the switches.

5.3.3 FUSE REPLACEMENT

The Model 4010 Central Electronics has two fuses. The one on the rear panel is a 3/4 amp slo-blo fuse. The fuse inside the unit is a 1 amp slo-blo.

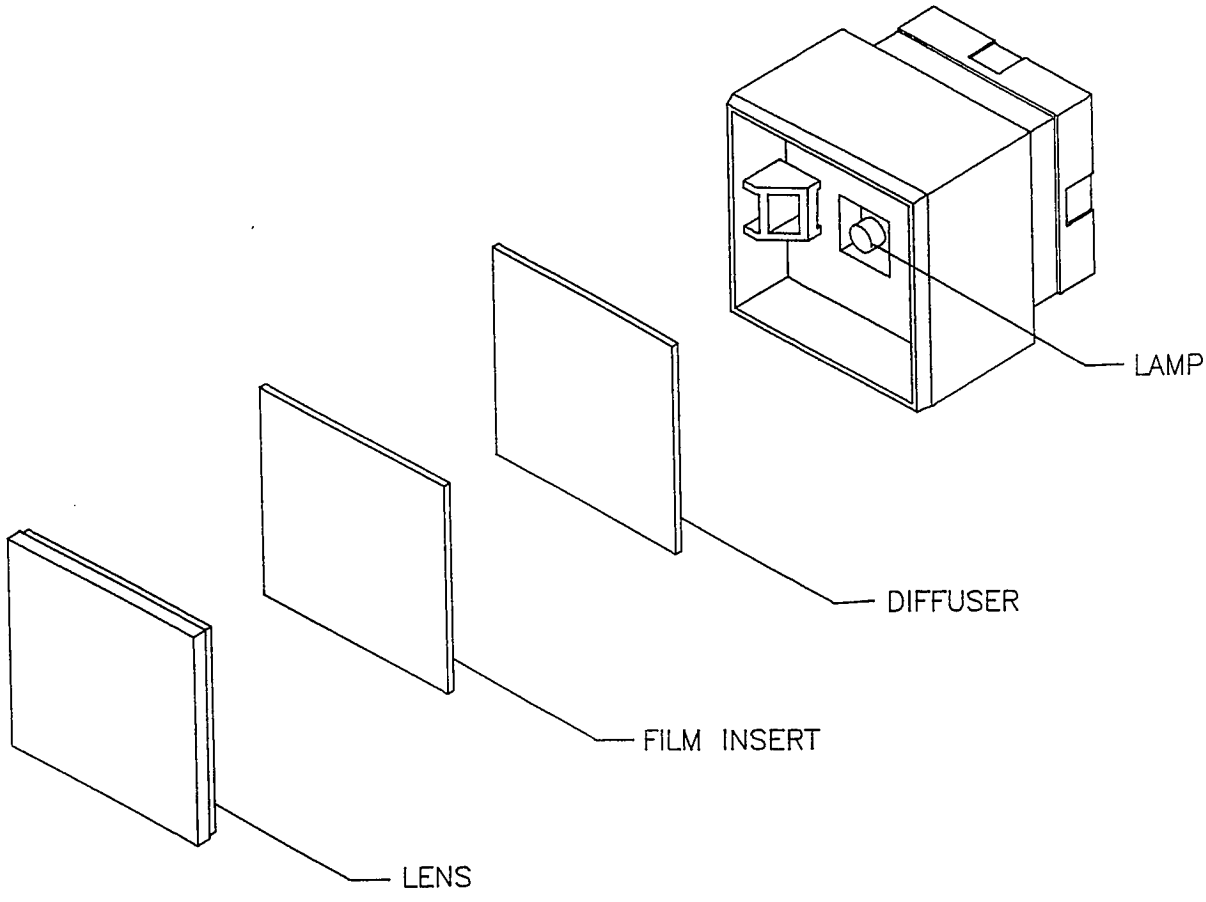


Figure 5-1
Lamp Replacement

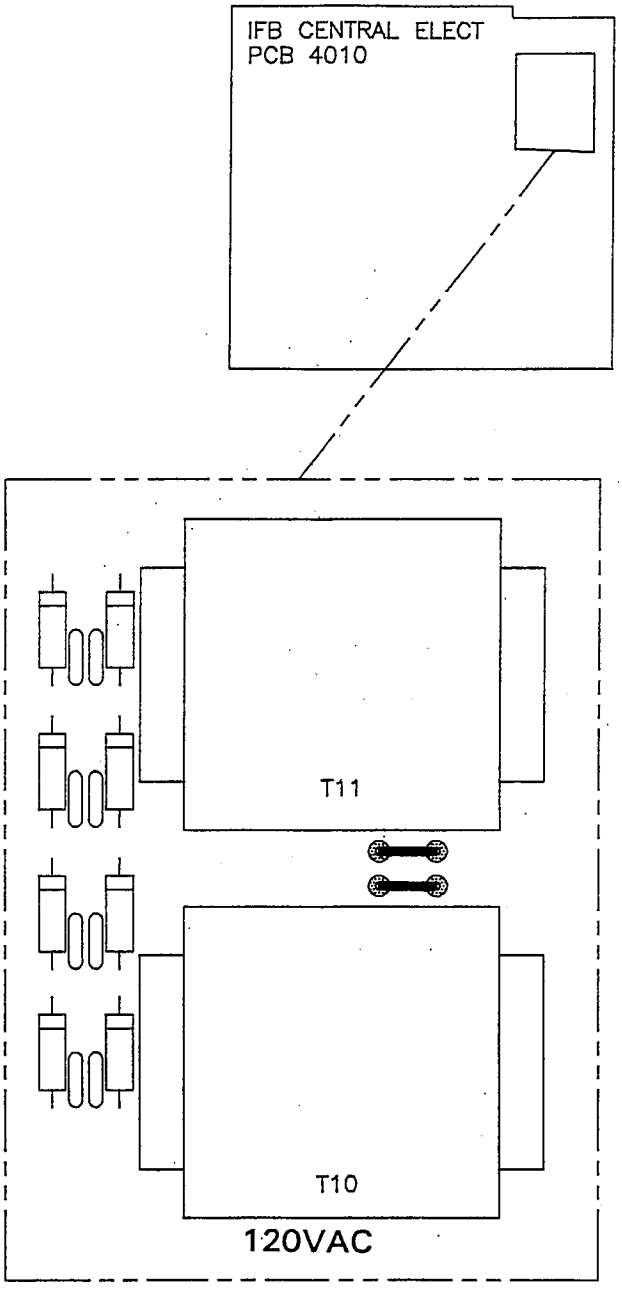


Figure 5-2A
Input Power Selection, 120 VAC

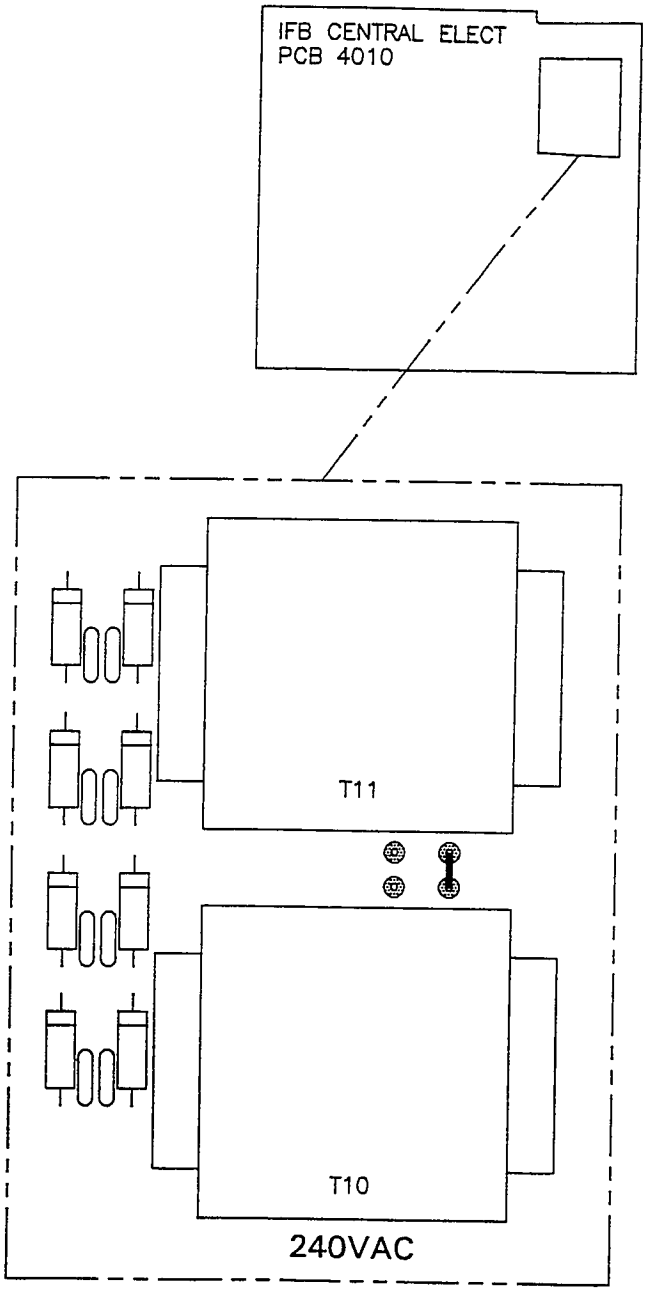


Figure 5-2B
Input Power Selection, 240 VAC

5.4 PERFORMANCE CHECK

5.4.1 MODEL 4010 TEST PROCEDURE

Equipment Needed:

Four Control Stations (4001(M), 4002(M), or 4003(M)):
A 4020 User Station.
Three program sources (oscillators etc.)
Stereo headphones
Oscilloscope
Voltmeter
Ac Voltmeter
Cable assembly
Variable voltage power transformer

I. Power Supply

A. With variable voltage transformer, turn voltage up slowly, check for excessive current drain. Measure the 13-volt, 24-volt, and 40-volt supplies. With 120 vac input, check for 14, 27, and 40 volts ± 10%.

B. Check for 29 volts ± 1 volt on each output.

C. Short each output while measuring the voltage across the respective 10-ohm, 5-watt resistor. Measure 1.8 volts ± 0.2 across each resistor with output shorted.

II. Program Inputs

Set all channel select switches to 1, all controls to minimum. Feed a 1-kHz tone to program channel 1, a 100-Hz tone to channel 2, and a 10-kHz tone to channel 3. Set tone level for +4 dBu.

A. With an oscilloscope on INT output 1, turn up level, watch for smooth operation of the pot, output level should reach -4 dBu. Switch program to channel 2, and then to 3, check to see that the level drops no more than 1.5 dB. Move the oscilloscope to NON-INT output 1, check for maximum level and switch program to 1,2,3.

B. Repeat A for channels 2 through 4.

C. SA. Connect scope to SA out, load with 2 kilohms, check for -1.2 dBu (1.8 volts p-p). Check programs 2 & 3.

III. Interrupts.

With program input, listen with belt pack on channel 1. Listen for noise. Set controls for program in both ears, mono-stereo switch in stereo position. Press priority 4 IFB1, listen for interrupt in the left ear only. While holding priority 4 down, press priority 3 IFB1, listen for override. Release priority 4. While holding 3, press priority 2 IFB1, listen for override. Release 3. While holding 2, press priority 1 IFB1, listen for override. Release both buttons. Move mono-stereo switch to mono and check for interrupt in both ears.Repeat for the other 3 channels.

IV. Headphone amp.

Plug test cable with 50-ohm load on each channel into test headphone jack. Turn monitor switch to Program 1, increase monitor level and check for clipping at 9 volts p-p on left channel. Turn monitor switch to program 2 and 3. Check for signal level greater than 4 volts p-p. Repeat for right channel.

Turn selector switch to SA, adjust SA controls so that program is visible on oscilloscope. Push the SA1 button on priority 1-4 and check for interrupt. Note: there is no priority on SA.

Turn selector switch to mic 1, press any priority 1 button and check for tone. Repeat for mic 2-4 (priority 2-4).

Plug in headphones to test jack and listen for noise and distortion on all positions.

5.4.2 MODEL 4001 CONTROL STATION MIC PRE TEST PROCEDURE

Equipment Needed:

Oscilloscope
Audio signal generator
Test jig with adapter cable

Inspection

Inspect the unit for missing parts or damage.

Test

Connect 14 volts ac to terminals 3 and 4 of TB27. Apply 123 millivolts p-p at 700 Hz to terminals 3 and 4 of TB1. Pin 4 is ground. Check for 17 volts dc on the filter capacitors.

Connect a scope with a 4,700 ohm load to pins 1 and 2 of P1. Adjust the limiter pot, R9, for 6.0 volts p-p output.

Reduce input signal by 20 dB to 12.3 millivolts p-p. The output signal should be above 5.0 volts p-p. Change the input frequency to 100 Hz, then to 10 kHz. The signal should remain above 4.0 volts p-p.

5.4.3 MODEL 4001 IFB CONTROL STATION TEST PROCEDURE

Equipment Needed:

Oscilloscope or stereo headphones
Two audio signal generators
Central Electronics, Model 4010
Tested Model 4001
Splitter Assembly, Model 4025

Inspection

Check for damage or missing parts. Check for broken or frayed wires. Check that R12 is 5.1 ohms and that U2 is an LM317MP.

Setup

Connect the left channel of the monitor headset jack (tip) from the 4010 to the oscilloscope, or plug in a set of stereo headphones. Set the 4010 for program on all four outputs and the SA output. Set the monitor select switch to OUT 1. On the 4001 being tested, plug the first 10-pin connector into J3 (the one nearest the board edge). Plug the fifth 10-pin connector into J2. Plug the 50-pin connector into the Splitter Assembly. Plug a tested 4001 into the Splitter Assembly also. Plug the splitter into the 4010 Central Electronics.

Connect a mic level signal (123 mV p-p) into the mic level input on the mic-pre, terminals 3 and 4 of TB1. Plug the power cords of both 4001's into 120 volts ac.

Test

Observe that the lights come on dimly. While watching the oscilloscope (or listening in the headphones) press the IFB1 button on the unit being tested. Notice the change in signal from the program to the mic-pre. Look for the light to go bright on both Control Stations. Release IFB1 and press IFB ALL, check for the change in signal and all the lights to go bright.

Turn the monitor select switch to OUT 2 and repeat the test for IFB2.

Turn the monitor select switch to OUT 3 and repeat for IFB3.

Turn the monitor select switch to OUT 4 and repeat for IFB4.

Turn the monitor select switch to SA. Connect the oscilloscope to ring of monitor headphone jack, and repeat for SA.

5.4.4 MODEL 4002 IFB CONTROL STATION TEST PROCEDURE

Equipment Needed:

Oscilloscope or stereo headphones
Two audio signal generators
Central Electronics, Model 4010
Tested Model 4002
Splitter Assembly, Model 4025

Inspection

Check for damage or missing parts. Check for broken or frayed wires. Check that R12 is 2.2 ohms and that U2 is an LM317MP.

Setup

Connect the left channel of the monitor headset jack (tip) from the Model 4010 to the oscilloscope, or plug in a set of stereo headphones. Set the 4010 for program on all four outputs and the SA output. Set the monitor select switch to OUT 1. On the 4002 being tested, plug the first 10-pin connectors into J7 and J8 . Plug the fifth 10-pin connectors into J5 and J6. Plug the 50-pin connector that

comes from J5 and J7 into the Splitter Assembly. Plug a tested 4002 into the Splitter Assembly also. Plug the splitter into the 4010 Central Electronics.

Connect a mic level signal (123 mV p-p) into the mic level input on the mic-pre, terminals 3 and 4 of TB1. Plug the power cords of the two 4002's into 120 volts ac.

Test

Observe that the lights come on dimly. While watching the oscilloscope (or listening in the headphones) press the IFB1 button on the unit being tested. Notice the change in signal from the program to the mic-pre. Look for the light to go bright on both Control Stations. Release IFB1 and press IFB ALL, check for the change in signal and all the lights to go bright except for the IFB ALL on the tested 4002.

Turn the monitor select switch to OUT 2 and repeat the above test for IFB2.

Turn the monitor select switch to OUT 3 and repeat for IFB3.

Turn the monitor select switch to OUT 4 and repeat for IFB4.

Turn the monitor select switch to SA. Connect the oscilloscope to ring of monitor headphone jack, and repeat for SA1.

Now unplug the 50-pin cables from both units and attach them to the other 50-pin connectors on the 4002's. Repeat the test for IFB5 - IFB8 and SA2, noting that the IFB ALL lamp will light on the 4002.

5.4.5 MODEL 4003 IFB CONTROL STATION TEST PROCEDURE

Equipment Needed:

Oscilloscope or stereo headphones
Two audio signal generators
Central Electronics, Model 4010
Tested Model 4003
Splitter Assembly, Model 4025

Inspection

Check for damage or missing parts. Check for broken or frayed wires. Check that R12 is 1 ohm and that U2 is an LM317T.

Set Up

Connect the left channel of the monitor headset jack (tip) from the Model 4010 to the oscilloscope, or plug in a set of stereo headphones. Set the 4010 for program on all four outputs and the SA output. Set the monitor select switch to OUT 1. On the 4003 being tested, plug the first 10-pin connectors into J12, J13, and J14 . Plug the fifth 10-pin connectors into J9, J10, and J11. Plug the 50-pin connector that comes from J9 and J12 into the Splitter Assembly.Also plug a tested 4003 into the Splitter Assembly. Plug the splitter into the 4010 Central Electronics.
Connect a mic level signal (123 mV p-p) into the mic level iput on the mic-pre, terminals 3 and 4 of TB1. Plug the power cords of the two 4003's into 120 volts ac.

Test

Observe that the lights come on dimly. While watching the oscilloscope (or listening in the headphones) press the IFB1 button on the unit being tested. Notice the change in signal from the program to the mic-pre. Look for the light to go bright on both Control Stations. Release IFB1 and press IFB ALL, check for the change in signal and all the lights to go bright except for the IFB ALL on the tested 4003.

Turn the monitor select switch to OUT 2 and repeat the above test for IFB2.

Turn the monitor select switch to OUT 3 and repeat for IFB3.

Turn the monitor select switch to OUT 4 and repeat for IFB4.

Turn the monitor select switch to SA. Connect the oscilloscope to ring of monitor headphone jack, and repeat for SA1.

Now unplug the 50-pin cables from both units and attach them to the second 50-pin connectors on the 4003's.

Repeat the above test for IFB5 - IFB8 and SA2. Unplug the 50-pin cables from both units and attach them to the third 50-pin connectors on the 4003's. Repeat the above test for IFB9 - IFB12 and SA3, noting that the IFB ALL lamp will light on the 4003.

5.4.6 MODEL 4020 USER STATION TEST PROCEDURE

I. Set Up

A. Equipment Needed:

Oscilloscope
Voltmeter
Audio signal generator
RTS Systems power supply or Model 4010 Central Electronics

B. Inspection

Check circuit board for damage or missing parts. Check for proper insertion of ic's. Check for broken or frayed wires.

C. Unit Set Up

Adjust both volume controls to minimum. Attach oscilloscope with 50-ohm load to the left channel output (tip) of the stereo headphone jack.

II. Test

Plug the unit in and check for 13 volts ± 1 volt on filter capacitor C12.

Apply a 1-kHz signal at 2 volts peak to peak to channel 1. This may be done through the 4010 Central Electronics or with an RTS Systems "TW" power supply. Output should be 0.6 volt peak to peak. Change the frequency to 10-kHz and to 100-Hz. The signal should remain above 0.4 volt peak to peak. Return the signal generator to 1 kHz. Increase the INT volume control so that the waveform is just clipped, then back off the control until no clipping is seen. The sine wave should be at least 9 volts p-p.

Repeat the procedure for channel 2, applying the signal to channel 2 and checking the right headphone output (ring). Check the mono headphone jack for output from channel 1.

Listen Test

Listen with headphones for noise and distortion.

5.5 TROUBLESHOOTING

This section is designed to help locate which unit in a system is at fault.

If no sound is heard at the belt pack, check to see that the Central Electronics is powered. Look for the green LED on the front panel of the Model 4010 to be on. Check for 29 volts dc on pins 1 and 2 of the XLR connector going to the User Station. The audio level should be 1 - 2 volts p-p on pins 1 and 2. If there is dc and audio present, replace the User Station.

If there is no dc and the green LED is on, check for a shorted cable. Repair or replace the Central Electronics as necessary.

If there is dc but no audio, check to see that program is entering the Central Electronics, that the program is selected on the front panel selector switches and that the volume level on the Central Electronics is turned up. Check to see if any buttons are pressed on the Control Stations, or remove the 50-pin plug at the Central Electronics. If still no audio, repair or replace the Model 4010 as required.

If a Control Station interrupts but has no audio, check to see that it is powered. The buttons should be lit dimly and should brighten when pressed. If the unit is powered but still no audio, check the microphone connections at the terminal block on the CC-4001 card of the Control Station.

If a Control Station does not interrupt, check the cables going to the Central Electronics. Make sure that the priority plug on the Control Station are plugged in. Replace the Control Station. If still no results, repair or replace the Central Electronics.

SECTION 6: LISTS OF REPLACEABLE PARTS

6.1 INTRODUCTION

This section contains parts lists and instructions for ordering replacement parts. The parts lists are divided into four sections: shipping list, final assembly, back panel and/or front panel and printed circuit board. Immediately following the description of a part is the manufacturer and the manufacturer's part number.

6.2 HOW TO OBTAIN PARTS

Parts may be obtained directly from Telex Communications, Inc.:

Telex Communications, Inc.
12000 Portland Avenue South,
Burnsville, MN 55337 U.S.A.
Telephone: (877) 863-4169
Fax: (800) 323-0498

6.3 SHIPPING LIST MODEL 4001 — 9000-2359-00

Qty	Description	RTS Part Number
1	Model 4001 Control Station	9000-2359-00
1	Power Supply, Calrad 45-768	2202-0009-00
1	Technical Manual	9300-2594-00
1	Shipping Carton	
1	Plastic Bag	

6.3.1 FINAL ASSEMBLY, MODEL 4001 — 9010-2003-00

Qty	Description	RTS Part Number
5	Spacer, Hex 4-40 x 3/4 Smith 9402L	1001-0133-00
5	Spacer, 3/16 D x 3/16 H RD No Thd, Smith 9016	1001-0134-00
2	Spacer, Hex 4-40 x 1 Thd, Smith 94020	1001-0135-00
1	Cable Mtg Cradle Panduit TM1S4	1005-0046-00
1	Hex Jack Screw, 9/16" Elec Hardware RA-47-50-7	1005-0092-00
4	Washer, Lock #4 Internal Tooth	1006-0003-00
4	Screw, 4-40 x 1/2" Phil, Pan Hd, Yel Cad	1008-4025-00
2	Screw, 4-40 x 3/4" Allen Set	1008-4079-00
6	Lens Cap, Flat Clear EAO 99-921.7	2705-0005-00
6	Legend Plate, Flat WH. EAO 99-908.9	2708-0011-00
1	Cable Assy, IFB & VI Per Dwg 2438	9020-2438-00
5	Connector, 10 Pin 3M 3473-6010	2007-0038-00

6.3.1 Final Assembly, Model 4001 -- 9010-2003-00 (continued)

Qty	Description	RTS Part Number
1	Conn. 50 Pin Male 3M 3564-1002	2008-0011-00
	Ribbon Cabble 50 Cond Spectra 8431352801050	2501-0001-00
1	Insert Labels, Model 4001 Per Ill 3382	9170-3382-05

6.3.2 Printed Circuit Assembly, Model 4001, Mic Pre Board, CC4000 -- 9030-1999-00

Qty	Description	RTS Part Number
1	Res. CF 10K ohm 1/4w 5%	1402-1002-5D
1	Res. CF 100K ohm 1/4w 5%	1402-1003-5D
1	Res. CF 10M ohm 1/4w 5%	1402-1005-5D
1	Res. CF 1.1K ohm 1/4w 5%	1402-1101-5D
3	Res. CF 220 ohm 1/4w 5%	1402-2200-5D
2	Res. CF 2.2K ohm 1/4w 5%	1402-2201-5D
1	Res. CF 22K ohm 1/4w 5%	1402-2202-5D
1	Res. CF 22 ohm 1/4w 5%	1402-22R0-5D
1	Res. CF 9.1K ohm 1/4w 5%	1402-9101-5D
1	Pot, Trim Linear 10K Piher PTC10LV10KA	1409-0009-00
1	Cap, .01uf/1Kv C.D. Disc Radial	1510-R103-2R
1	Cap, 47pf/50v C.D. Radial, .2LS	1510-R470-2I
1	Cap, Mono .01uf/50v .1 Lead Spacing	1511-R103-2I
4	Cap. Mono .1uf/50v .1 Spacing, 1" Length	1511-R104-2I
1	Cap, .22uf/50v Mono Cer Radial 10%	1511-R224-2I
2	Cap, Elec 1000uf/25v Axial	1513-A108-4F
1	Cap, Elec 10uf/16v Radial	1513-R106-4E
1	Cap, Elec 100uf/16v Radial	1513-R107-4E
1	Cap, Elec 47uf/16v Radial	1513-R476-4E
1	Cap, Tant, .47/50V Radial	1515-R474-3I
4	Diode, MR502 Motorola	1601-0502-00
2	Diode, IN6263 Signal	1601-6263-00
1	Transistor, J305 Siliconix	1602-0305-00
1	I.C. LM78LO5ACZ National	1603-0001-00
1	I.C. Socket, 8 Pin Burndy DIL8P-108	2001-0001-00
1	Header Molex 22-14-2044	2006-0020-00
1	PCB, CC4000 Mic Pre Bd FAB Per Dwg 2000	9040-2000-00
2	Term Block 4 Pos Electrovert 251040453	2007-0013-00
1	Transformer, Audio Bourns LM9003	2306-0001-00
5	Coupling Piece EAO 99-910	1005-0033-00
1	Diode, MR502 Motorola	1601-0502-00
22	Diode, 1N4004 1 Amp, 400V	1601-4004-00
2	Diode, 1N5333 Zener Voltage Regulator	1601-5333-0B
6	Lamp, 18 Volt JKL 8099SBP	1802-8099-00
6	Switch, EAO 99-456 Momentary Lighted P/B	1911-0013-00
1	Header, 4 Pos. Berg 65646-404	2007-0092-00

6.3.2 Printed Circuit Assembly, Model 4001, Mic Pre Board, CC4000 -- 9030-1999-00

Qty	Description	RTS Part Number
6	Switch Lens Holder Gray, EAO 99-920.8	2711-0001-00
2	Header, 14 Pin, DL Row Str, Berg 65611-414	9020-5841-14
	Header, 72 Pin Berg 65611-472	2007-0039-00
1	PCB, 4001 SwBd (EAO) FAB Per Dwg 4375	9040-4375-00

6.3.3 Front Panel, Model 4001 -- 9070-2006-00

Qty	Description	RTS Part Number
8.5	Extrusion, Front Panel W/O Grooves, 4' x 1 3/4"	9050-2314-00

6.3.3.1 Front Panel, Model 4001M Gooseneck -- 9070-2360-00

Qty	Description	RTS Part Number
1	Gooseneck Mic, 20"	2608-0025-00
1	Gooseneck Windscreen	2612-0121-00

6.4 Shipping List, Model 4002 -- 9000-2361-00

Qty	Description	RTS Part Number
1	Model 4002 Control Station	9000-2361-00
1	Power Supply, Calrad 45-768	2202-0009-00
1	Technical Manual	9300-2594-00
1	Shipping Carton	
1	Plastic Bag	

6.4.1 Final Assembly, Model 4002 -- 9010-2011-00

Qty	Description	RTS Part Number
7	Spacer, Hex 4-40 x 3/4 Smith 9402L	1001-0133-00
4	Spacer, 3/16 D. x 3/16 H. RD No Thd, Smith 9016	1001-0134-00
4	Spacer, Hex 4-40 x 1 Thd, Smith 9402Q	1001-0135-00
2	Cable MTG Cradle Panduit TM1S4	1005-0046-00
2	Hex, Jack Screw, 9/16" Elec Hdware RA-47-50-7	1005-0092-00
5	Washer, Lock #4 Internak Tooth	1006-0003-00
5	Screw, 4-40 x 1/2" Phil, Pan Hd, Yel Cad	1008-4025-00
4	Screw, 4-40 x 3/4" Allen Set	1008-4079-00

6.4.1 Final Assembly, Model 4002 -- 9010-2011-00

Qty	Description	RTS Part Number
11	Lens Cap, Flat Clear EAO 99-921.7	2705-0005-00
11	Legend Plate, Flat Wh. EAO 99-908.9	2708-0011-00
2	Cable Assy, IFB & VI Per Dwg 2483	9020-2438-00
10	Connector, 10 Pin 3M 3473-6010	2007-0038-00
2	Conn. 50 Pin Male 3M 3564-1002	2008-0011-00
	Ribbon Cable 50 Cond Spectra 8431352801050	2501-0001-00
1	Insert Labels, Model 4001 Per Ill 3382	9170-3382-05

6.4.2 Printed Circuit Assembly, Model 4002, Mic Pre Board, CC4000, -- 9030-1999-00

Qty	Description	RTS Part Number
1	Res. CF 10K ohm 1/4w 5%	1402-1002-5D
1	Res. CF 100K ohm 1/4w 5%	1402-1003-5D
1	Res. CF 10M ohm 1/4w 5%	1402-1005-5D
1	Res. CF 1.1K ohm 1/4w 5%	1402-1101-5D
3	Res. CF 220 ohm 1/4w 5%	1402-2200-5D
2	Res. CF 2.2K ohm 1/4w 5%	1402-2201-5D
1	Res. CF 22K ohm 1/4w 5%	1402-2202-5D
1	Res. CF 22 ohm 1/4w 5%	1402-22R0-5D
1	Res. CF 9.1K ohm 1/4w 5%	1402-9101-5D
1	Pot, Trim Linear 10K Piher PTC10LV10KA	1409-0009-00
1	Cap, .01uf/1Kv C.D. Disc adial	1510-R103-2R
1	Cap, 47pf/50v C.D. Radial, 2LS	1510-R470-2I
1	Cap, Mono .01uf/50v .1 Lead Spacing	1511-R103-2I
4	Cap, Mono .1uf/50v .1 Spacing, 1" Length	1511-R104-2I
1	Cap, .22uf/50v Mono Cer Radial 10%	1511-R224-2I
2	Cap, Elec 1000uf/25v Axial	1513-A108-4F
1	Cap, Elec 10uf/16v Radial	1513-R106-4E
1	Cap, Elec 100uf/16v Radial	1513-R107-4E
1	Cap, Elec 47uf/16v Radial	1513-R476-4E
1	Cap, Tant .47/50V Radial	1515-R474-3I
4	Diode, MR502 Motorola	1601-0502-00
2	Diode, IN6263	1601-6263-00
1	Transistor, J305 Siliconix	1602-0305-00
1	I.C. LM78L05ACZ	1603-0001-00
1	Voltage Regulator, National LM317MP	1603-0317-MP
1	I.C., NE5532N Signetics	1603-5532-0N
1	I.C. Socket, 8 Pin Burndy DIL8P-108	2001-0001-00
1	Header Molex 22-14-2044	2006-0020-00
2	Term Block 4 Pos Electrovert 251040453	2007-0013-00
1	Transformer, Audio Bourns LM9003	2306-0001-00
1	PCB, CC4000 Mic Pre Bd FAB Per Dwg 2000	9040-2000-00

6.4.3 Printed Circuit Assembly, Model 4002, Switch Board -- 9030-4376-00

Qty	Description	RTS Part Number
9	Coupling Piece EAO 99-910	1005-0033-00
1	Res. CF 100 ohm 1/2w 5%	1402-1000-5E
6	Diode, MR502 Motorola	1601-0502-00
43	Diode, 1N4004 1 Amp, 400V	1601-4004-00
1	Relay, Gordos 835C3 500 Ohm, 12V, Form 1C	1701-0002-01
11	Lamp, 18 Volt JKL 8099SBP	1802-8099-00
11	Switch, EAO 99-456 Momentary Lighted P/B	1911-0013-00
1	I.C. Socket, 14 Pin Burndy DIL14P-108	2001-0002-00
1	Header, 4 Pos Berg 65646-404	2007-0092-00
11	Switch Lens Holder Gray, EAO 99-920.8	2711-0001-00
4	Header, 14 Pin, DL Row STR, Berg 65611-414	9020-5841-14
	Header, 72 Pin Berg 65611-472	2007-0039-00

6.4.5 Front Panel, Model 4002 -- 9070-2014-00

Qty	Description	RTS Part Number
12	Extrusion, Front Panel W/O Grooves, 4' x 1 3/4"	9050-2314-00

6.4.5.1 Front Panel, Model 4002M Gooseneck -- 9070-2361-00

Qty	Description	RTS Part Number
1	Gooseneck Mic, 20"	2608-0025-00
1	Gooseneck Windscreen	2612-0121-00

6.5 Shipping List, Model 4003 9000-2363-00

Qty	Description	RTS Part Number
1	Model 4003 Control Station	9000-2363-00
1	Power Supply, Calrad 45-768	2202-0009-00
1	Technical Manual	9300-2594-00
1	Shipping Carton	
1	Plastic Bag	

6.5.1 Final Assembly, Model 4003 -- 9010-2019-00

Qty	Description	RTS Part Number
9	Spacer, Hex 4-40 x 3/4 Smith 9402L	1001-0133-00
4	Spacer, 3/16 D. x 3/16 H. RD No Thd, Smith 9016	1001-0134-00
6	Spacer, Hex 4-40 x 1 Thd, Smith 9402Q	1001-0135-00
3	Cable MTG Cradle Panduit TM1S4	1005-0046-00
3	Hex Jack Screw, 9/16" Elec Hdware RA-47-50-7	1005-0092-00
6	Washer, Lock #4 Internal Tooth	1006-0003-00
6	Screw, 4-40 x 1/2" Phil, Pan Hd, Yel Cad	1008-4025-00
6	Screw, 4-40 x 3/4" Allen Set	1008-4079-00
16	Lens Cap, Flat Clear EAO 99-921.7	2705-0005-00
16	Legend Plate, Flat Wh. EAO 99-908.9	2708-0011-00
3	Cable Assembly, IFB & VI Per Dwg 2438	9020-2438-00
15	Connector, 10 Pin 3M 3473-6010	2007-0038-00
3	Conn. 50 Pin Male 3M 3564-1002	2008-0011-00
	Ribbon Cable 50 Cond Spectra 8431352801050	2501-0001-00
1	Insert Labels, Model 4002 Per Ill 3382	9170-3382-13

6.5.2 Printed Circuit Assembly, Model 4003, Mic Pre Board, CC4000 -- 9030-1999-00

Qty	Description	RTS Part Number
1	Res. CF 10K ohm 1/4w 5%	1402-1002-5D
1	Res. CF 100K ohm 1/4w 5%	1402-1003-5D
1	Res. CF 10M ohm 1/4w 5%	1402-1005-5D
1	Res. CF 1.1K ohm 1/4w 5%	1402-1101-5D
3	Res. CF 220 ohm 1/4w 5%	1402-2200-5D
2	Res. CF 2.2K ohm 1/4w 5%	1402-2201-5D
1	Res. CF 22K ohm 1/4w 5%	1402-2202-5D
1	Res. CF 22 ohm 1/4w 5%	1402-22R0-5D
1	Res. CF 9.1K ohm 1/4w 5%	1402-9101-5D
1	Pot, Trim Linear 10K Puher PTC10LV10KA	1409-0009-00
1	Cap, .01uf/1Kv C.D. Disc Radial	1510-R103-2R
1	Cap, 47pf/50v C.D. Radial, .2LS	1510-R470-2I
1	Cap, Mono .01uf/50v .1 Lead Spacing	1511-R103-2I
4	Cap, Mono .1uf/50v .1 Spacing, 1" Length	1511-R104-2I
1	Cap, .22uf/50v Mono Cer Radial 10%	1511-R224-2I
2	Cap, Elec 1000uf/25v Axial	1513-A108-4F
1	Cap, Elec 10uf/16v Radial	1513-R106-4E
1	Cap, Elec 100uf/16v Radial	1513-R107-4E
1	Cap, Elec 47uf/16v Radial	1513-R476-4E
4	Diode, MR502 Motorola	1601-0502-00
2	Diode, 1N6263 Signal	1601-6263-00
1	Transistor, J305 Siliconix	1602-0305-00
1	I.C. LM78L05ACZ National	1603-0001-00

6.5.2 Printed Circuit Assembly, Model 4003, Mic Pre Board, CC4000 -- 9030-1999-00

Qty	Description	RTS Part Number
1	Voltage Regulator, National LM317MP	1603-0317-MP
1	I.C., NE5532N Signetics	1603-5532-0N
1	I.C. Socket, 8 Pin Burndy DIL8P-108	2001-0001-00
1	Header Molex 22-14-2044	2006-0020-00
2	Term Block 4 Pos Electrovert 251040453	2007-0013-00
1	Transformer, Audio Bourns LM9003	2306-0001-00

6.5.3 Printed Circuit Assembly, Model 4003, Switch Board, CC4000 -- 9030-4377-00

Qty	Description	RTS Part Number
14	Coupling Piece EAO 99-910	1005-0033-00
8	Diode, MR502 Motorola	1601-0502-00
61	Diode, 1N4004 1 Amp, 400V	1601-4004-00
2	Relay, 150 Ohm 5V Coil Mouser ME431-2305	1701-0012-00
16	Lamp, 18 Volt JKL 8099SBP	1802-8099-00
16	Switch, EAO 99-456 Momentary Lighted P/B	1911-0013-00
2	I.C. Socket, 14 Pin Burndy DIL14P-108	2001-0002-00
1	Header, 4 Pos. Berg 65646-404	2007-0092-00
16	Switch Lens Holder Gray, EAO 99-920.8	2711-0001-00
6	Header, 14 Pin, DL Row Str, Berg 65611-414	9020-5841-14
1	Header, 72 Pin Berg 65611-472	2007-0039-00

6.5.4 Front Panel, Model 4003 -- 9070-2022-00

Qty	Description	RTS Part Number
19	Extrusion, Front Panel W/O Grooves, 4' x 1 3/4	9050-2314-00

6.5.4.1 Front Panel, Model 4003M Gooseneck -- 9070-2364-00

Qty	Description	RTS Part Number
1	Gooseneck Mic, 20"	2608-0025-00
1	Gooseneck Windscreen	2612-0121-00

6.5.5 Shipping List, Model 4010 -- 9000-2365-00

Qty	Description	RTS Part Number
1	Model 4010 Central Electronics	9000-2365-00
27	Spade Lug, T & B RA2217	1003-0012-00
4	Washer, Nylon #10 Smith 2674	1006-0016-00
4	Nut, Hex Kep 6-32	1007-0002-00
4	Screw, 10-32 x 1/2" Truss Hd, Phil Cad	1008-1005-00
4	Screw, 6-32 x 3/8" Truss Hd, Phil Black	1008-6012-00
1	Cable Tie Panduit PLT2M	2516-0008-00
4	Rubber Stick On Button Gray, 3M SJ5012	4501-5012-00
1	Technical Manual	9300-2594-00

6.5.6 Final Assembly, Model 4010 -- 9010-2138-00

Qty	Description	RTS Part Number
1	Washer, Nylon Shoulder Smith 2668	1006-0004-00
4	Washer, Flat 3/8"	1006-0010-00
4	Nut, Hex Kep 6-32	1007-0002-00
8	Nut, Hex 3/8"	1007-0003-00
4	Screw, 4-40 x 1/4" pan Hd, Phil, Yel Cad	1008-4023-00
4	Screw, 6-32 x 3/8" Binding Hd.	1008-6009-00
4	Screw, 8-32 x 3/8" Pan Hd, Phil	1008-8022-00
4	Screw, 8-32 x 3/8" Flat Hd, Phil, Blk Oxd	1008-8024-00
1	L.E.D. Green Oshino OLG124	1801-0124-0G
8	Transformer Can Hudson HU-5365-688-MU	2402-0001-00
1	Knob, Black Alco K500B-1/8	2703-0500-0B
2	Knob, Single Blk 1/4" Alco K700B	2703-0700-0B
4	Knob, Dual Blk 1/4" Alco, K5700B	2703-5700-0B
1	Insert Labels, Model 4003 Per Ill 3382	9170-3382-04

6.5.7 Back Panel Assembly, Model 4010 -- 9020-2139-00

Qty	Description	RTS Part Number
1	Lug, Solder #4 Smith 1414-4	1003-0004-00
1	Cable MTG Cradle Panduit TM1S4	1005-0046-00
1	Hex Jack Screw, 9/16" Elec Hdware RA-47-50-7	1005-0092-00
3	Nut, Radio Hex 4-40 Clear Cad	1007-0007-00
1	Screw, 4-40 x 1/2" Phil, Pan Hd, Yel Cad	1008-4025-00
2	Screw, 4-40 x 3/8" Pan Hd, Phil, Cad	1008-4035-00
1	Power Cord 6'" Gray Belden 17237	2504-0004-00
1	Strain Releif Heyco 1137	2509-1137-00
1	Fuse, 3/4 Amp Slo-Blo Littlefuse 313.750	2801-0016-00

6.5.7 Back Panel Assembly, Model 4010 -- 9020-2139-00

Qty	Description	RTS Part Number
1	Fuse Carrier Schurter Fek 031.1666	2802-0002-00
1	Fuse Holder Body Schurter PCC 031. 1653	2802-0003-00
1	Cable Assembly, Model 4010	9020-2141-00
5	Connector, 10 Pin 3M 3473-6010	2007-0038-00
1	Conn. 50 pin Female 3M 3565-1000	2008-0013-00
2	Ribbon Cable 50 Cond Spectra 8431352801050	2501-0001-00
1	Back Panel, Model 4010 Per FAB 1978-1/FD1980	9080-1980-00
1	Cover Plate, Per FAB Dwg 2332	9100-2332-00
2	Cover Assembly, Model 4010	9020-2140-00
2	Fiberglass, .008 Thk 14 x 16	1303-0003-00
2	Cover, Top/Bottom Model 4010 Per FAB Dwg 1982	9100-1982-00

6.5.8 Printed Circuit Assembly, Model 4010, CC4010 -- 9030-1974-00

Qty	Description	RTS Part Number
1	Washer, lock #4 Internal Tooth	1006-0003-00
10	Washer, Lock #6 Int'l Tooth, Zinc plated	1006-0006-00
1	Nut, Radio Hex 4-40 Clear Cad	1007-0007-00
4	Nut, Pem 6-32 Penn Eng KF2-632	1007-0008-00
10	Nut, Hex 6-32 Radio Pattern	1007-0022-00
1	Screw, 4-40 x 3/8" Pan Hd, Phil , Cad	1008-4035-00
1	Res. CC 3.3K ohm 1w 5%	1401-3301-5F
1	Res. CF 100 ohm 1/4w 5%	1402-1000-5D
4	Res. CF 100 ohm 1/2w 5%	1402-1000-5E
18	Res. CF 1K ohm 1/4w 5%	1402-1001-5D
33	Res. CF 10K ohm 1/4w 5%	1402-1002-5D
4	Res. CF 100K ohm 1/4w 5%	1402-1003-5D
2	Res. CF 10 ohm 1/2w 5%	1402-10R0-5E
2	Res. CF 150 ohm 1/4w 5%	1402-1500-5D
1	Res. CF 1.5K ohm 1/4w 5%	1402-1501-5D
5	Res. CF 200 ohm 1/4w 5%	1402-2000-5D
6	Res. CF 2.2K ohm 1/4w 5%	1402-2201-5D
4	Res. CF 2.2K ohm 1w 5%	1402-2201-5F
45	Res. CF 22K ohm 1/4w 5%	1402-2202-5D
5	Res. CF 22 ohm 1/4w 5%	1402-22R0-5D
3	Res. CF 240 ohm 1/4w 5%	1402-2400-5D
25	Res. CF 39K ohm 1/4w 5%	1402-3902-5D
10	Res. CF 470 ohm 1/4w 5%	1402-4700-5D
4	Res. CF 4.7K ohm 1/4w 5%	1402-4701-5D
50	Res. CF 47K ohm 1/4w 5%	1402-4702-5D
2	Res. CF 4.7 ohm 1/4w 5%	1402-4R70-5D
3	Res. CF 51K ohm 1/4w 5%	1402-5102-5D

6.5.8 Printed Circuit Assembly, Model 4010, CC4010 -- 9030-1974-00

Qty	Description	RTS Part Number
2	Res. CF 820 ohm 1/2w 5%	1402-8200-5E
4	Res. MF 1.21K ohm 1/4w 1%	1403-1211-2D
1	Res. MF 243 ohm 1/4w 1%	1403-2430-2D
4	Res. MF 27.4K ohm 1/4w 1%	1403-2742-2D
1	Res. MF 4.02K ohm 1/4w 1%	1403-4021-2D
4	Res. WW 10 ohm 5w 5%	1401-10R0-5I
1	Pot, 50K Audio "CP" AB 70U4N040S503A	1406-0037-00
1	Pot, 10K Audio Dual Bourns 81A2AB24D15D15	1407-0008-00
4	Pot, DL 50K Audio "CP" AB 26M906	1407-0020-00
4	Pot, Trim 500 ohm Piher PT10LV	1409-0017-00
9	Cap, 100pf/50v Cer Disc Radial	1510-R101-2I
4	Cap, .001uf/100v C.D. Radial - Min 1" Leads	1510-R102-2L
12	Cap, .01uf/1kv C.D. Disc radial	1510-R103-2R
2	Cap, 220pf/50v Cer Disc Radial	1510-R221-2I
2	Cap, 470pf/50v Cer Disc Radial	1510-R471-2I
12	Cap, Mono .1uf/50v .1 Spacing, 1" Length	1511-R104-2I
3	Cap, Elec 3300uf/25v Axial	1513-A338-4F
6	Cap, Elec 10uf/50v Radial	1513-R106-4I
8	Cap, Elec 100uf/16v Radial	1513-R107-4E
7	Cap, Elec 47uf/25v radial	1513-R476-4F
1	Cap, Mylar .1uf/400v Radial	1514-R104-2P
4	Cap, MMK 1/100V 10% Sub= 1514-R105-2U	1514=R105-2L
17	Cap, Tant 10uf/16v Radial	1515-R106-3E
2	Cap, .01/5kv, Cer, 1400V Murata DE7150FZ103PVA1	1524-R103-2X
15	Diode, MR502 Motrola	1601-0502-00
30	Diode, 1N914B Signal	1601-0914-0B
56	Diode, 1N4004 1 Amp, 400V	1601-4004-00
1	Diode, 1N5234B Voltage Regulator 6.2V	1601-5234-0B
2	Transistor, MPSU45 Motorola	1602-0045-00
4	Transistor, MPS4355 Motorola, PNP	1602-4355-00
4	Transistor, 2N4401 Motorola, NPN	1602-4401-00
3	I.C., MC14012BCP Motorola	1603-0002-00
2	I.C., MC14049UBCP Motorola	1603-0003-00
5	Voltage Regulator LM317K, National	1603-0317-0K
1	Voltage Regulator LM317T National	1603-0317-0T
3	Voltage Regulator, National LM317MP	1603-0317-MP
2	I.C. SGS TBA-820-M	1603-0820-0M
5	I.C. MC3358P Motorola Sub= 1603-3458-0P	1603-3358-0P
10	I.C. Analog Switch RCA CD4053BE	1603-4053-BE
2	Relay, Gordos 835C3 500 ohm, 12V, Form 1C	1701-0002-01
4	Switch, Slide, SPDT C&K 1101M2-CQ	1902-0002-00
9	Switch, 3 Pos. Pc Mt C&K 7211-SPY-ABE	1903-0019-00
1	Switch, Rotary 12 Pos. RCL 0201XC30B12UPJAR16	1904-0001-00
7	I.C. Socket, 8 Pin Burndy DIL8P-108	2001-0001-00

6.5.8 Printed Circuit Assembly, Model 4010, CC4010 -- 9030-1974-00

Qty	Description	RTS Part Number
5	I.C. Socket, 14 Pin Burndy DIL14P-108	2001-0002-00
12	I.C. Socket, 16 Pin Burndy DIL16P-108	2001-0003-00
1	Term Strip 27 Pos Mgnum A104227NL-R26	2007-0004-00
1	Jack, Phono 1/4" SMK S-G7713	2013-0001-00
3	Transformer EWC LP-20-600-B8	2301-0006-00
8	Transformer, Audio Bourns LM9003	2306-0001-00
8	#73 Shield Bead Fairrite 267300601	2404-0001-00
1	Fuse, 1 Amp Slo-Blo, Littlefuse 313001	2801-0007-00
2	Fuse Clip P.C. Littlefuse 102071	2802-0005-00
5	Heatsink IERC 462-T03	4502-0001-00
1	Heatsink Aham 363	4502-0002-00
5	Header, 14 Pin, Dl Row Str, Berg 65611-414	9020-5841-14
	Header, 72 Pin Berg 65611-472	2007-0039-00

6.5.9 Front Panel, Model 4010 -- 9070-1977-00

Qty	Description	RTS Part Number
19	Ext. Front 12' x 1 3/4" Die 3854 Alloy 6063T5	9050-1628-00
2	IFB Front Panel Side Rail, Model 4010	9100-2203-00
29	Ext. Side 10' x 1 3/4" Die 3780 Mat'l 6063T6	9050-1587-00
2	Support Bracket, Model 4010 Per FAB Dwg 2326	9110-2326-00

6.6 Shipping List, Model 4020 -- 9000-2368-00

Qty	Description	RTS Part Number
1	Model IFB Belt Pack Talent Electronics	9000-2368-00
1	Technical Manual	9300-2594-00
1	Shipping Carton	
1	Plastic Bag	

6.6.1 Final Assembly, Model 4020 -- 9010-1927-00

Qty	Description	RTS Part Number
2	Washer, Lock .375-32 Internal Tooth	1006-0015-00
2	Washer, Teflon Seastrom 5612-37-40	1006-0044-00
4	Nut, Hex .375-32	1007-0012-00
8	Screw, 8-18 x 1/2" Flat Hd, Self Forming	1008-8007-00
2	Knob, Gray Selco S150-250	2703-0002-00
2	Cap, Gray W/Dot Sifam C152	2705-0001-00
2	Nut Cover, Gray Sifam, N150	2706-0001-00

6.6.2 Back Panel Assembly, Model 4020 -- 9020-1926-00

Qty	Description	RTS Part Number
2	Washer, Lock #4 Internal Tooth	1006-0003-00
2	Washer, Lock .375-32 Internal Tooth	1006-0015-00
2	Nut, Hex Kep 4-40	1007-0001-00
2	Nut, Hex .375-32	1007-0012-00
2	Screw 4-40 x 3/8" 100de Fl Hd, C/R, Br Wh Zinc	1008-4012-00
1	Conn. Carbon Mic. Switchcraft MN114B	2013-0003-00
1	Phono Jack, Mono Switchcraft N-111	2013-0012-00
1	Conn. 3 Pin Female Hirose HA16PR-3S	2018-0036-00
1	Wire, 24 Awg, Blue Vinyl, Stranded, 5"	2511-0005-00
1	Wire, 24 Awg, Brown Vinyl, Stranded, 5"	2511-0006-00
3	Wire, 24 Awg, Black Vinyl, Stranded, 5"	2511-0007-00
1	Wire, 24 Awg, Red Vinyl, Stranded, 5"	2511-0008-00
1	Wire, 24 Awg, Green 5" Long	2511-0010-00
1	Wire, 24 Awg, Violet 5" Long	2511-0124-00
1	Case Assembly, Model 4020	9020-2179-00
2	Pop Rivet Dome Head Whittson SSD 4.2	1002-0006-00
1	Extruded Case, Model 4020 Per FAB Dwg FD1818	9060-1818-00
4	Ext. Model 4020 Case 6' x 3" x 1 1/2", ATI #6301	9050-6301-00
1	Belt Clip Per FAB Dwg 1385	9110-1385-00

6.6.3 Printed Circuit Assembly, Model 4020 -- 9030-1904-00

Qty	Description	RTS Part Number
1	Res. CF 10K ohm 1/4w 5%	1402-1002-5D
3	Res. CF 10 ohm 1/2w 5%	1402-10R0-5E
1	Res. CF 11K ohm 1/4w 5%	1402-1102-5D
1	Res. CF 1.2K ohm 1/4w 5%	1402-1201-5D
2	Res. CF 150 ohm 1/4w 5%	1402-1500-5D
4	Res. CF 22K ohm 1/4w 5%	1402-2202-5D

6.6.3 Printed Circuit Assembly, Model 4020 -- 9030-1904-00 (continued)

Qty	Description	RTS Part Number
2	Res. CFF 2.7 ohm 1/4w 5%	1402-2R70-5D
2	Res. CF 470 ohm 1/4w 5%	1402-4700-5D
2	Pot, 50K Audio "CP" AB 70U4N040S503A	1406-0037-00
2	Cap, 220pf/50v Cer Disc Radial	1510-R221-2I
2	Cap, 470pf/50v Cer Disc Radial	1510-R471-2I
5	Cap, Mono .1uf/50v .1 Spacing, 1" Length	1511-R104-2I
2	Cap, Elec 10uf/16v Radial	1513-R106-4E
2	Cap, Elec 100uf/10v Radial	1513-R107-4C
3	Cap, Elec 100uf/16v Radial	1513-R107-4E
2	Cap, Elec 1000uf/16v Radial	1513-R108-4E
2	Cap, Tant 1uf/35v Radial	1515-R105-3G
5	Diode, 1N4004 1 Amp, 400V	1601-4004-00
1	Voltage Regulator, National LM317MP	1603-0317-MP
2	I.C. SGS TBA-820-M	1603-0820-0M
2	I.C. Socket, 8 Pin Burndy DIL8P-108	2001-0001-00
1	Rubber Stick On Button Gray, 3M SJ5012	4501-5012-00

Notes:

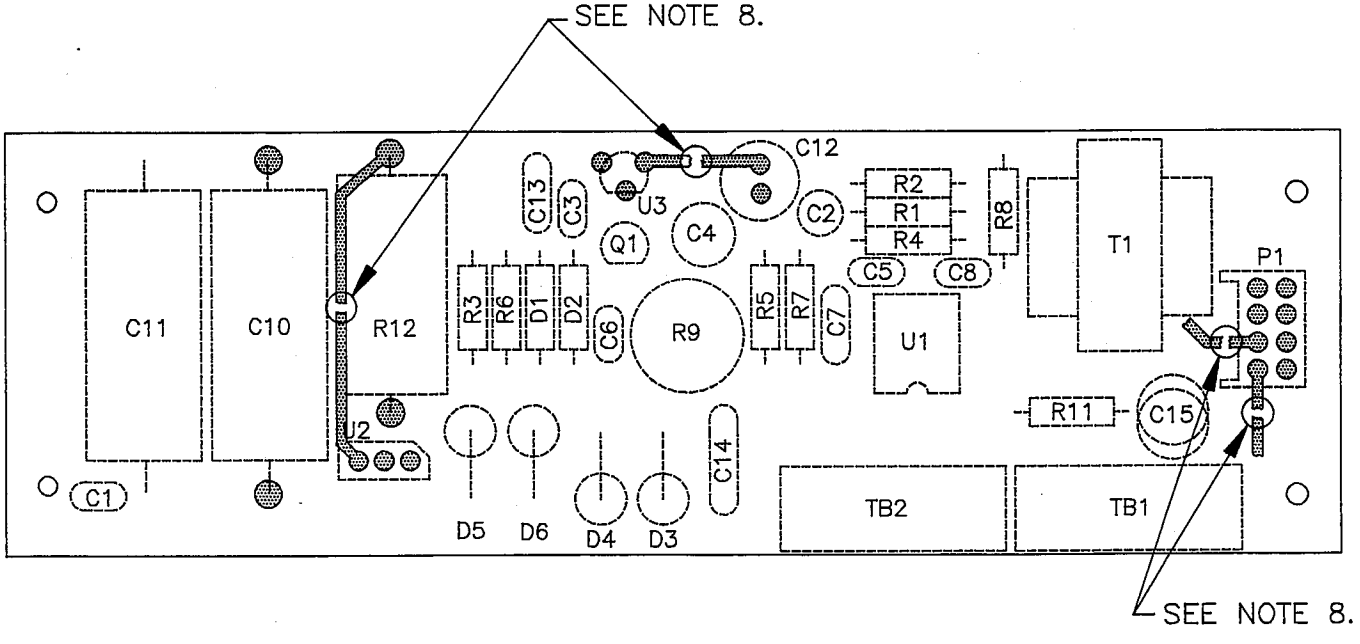
APPENDIX A
SS2000 Microphone Preamplifier Board Engineering Updates

RTS System has modified the microphone preamplifier circuit board (SS2000) used in the Models 4001/4001M, 4002/4002M, and 4003/4003M Control Stations.

If your control station was shipped prior to Jan 12, 1987 and exhibits excessive noise and hum; follow the factory guidelines and modify the SS2000 in your control station to correct the problem.

Carefully follow the instruction below to make the modifications:

1. Disconnect the control station from the system and carefully note the positions of the cables connected to the SS2000 circuit board. Disconnect the cables and remove the SS2000 from the control station.
2. Remove resistor R12.
3. Cut all traces shown as shown. To cut the traces, make 2 parallel cuts a 16th of an inch apart from each other and heat the area in between with a soldering iron. The trace will com right off. Be extremely careful not to damage any of the traces next to the ones you are cutting. When cutting the trace next to the annode of diode D3, cut the L shaped piece away from the pad, not the long part of the leg. See detail.

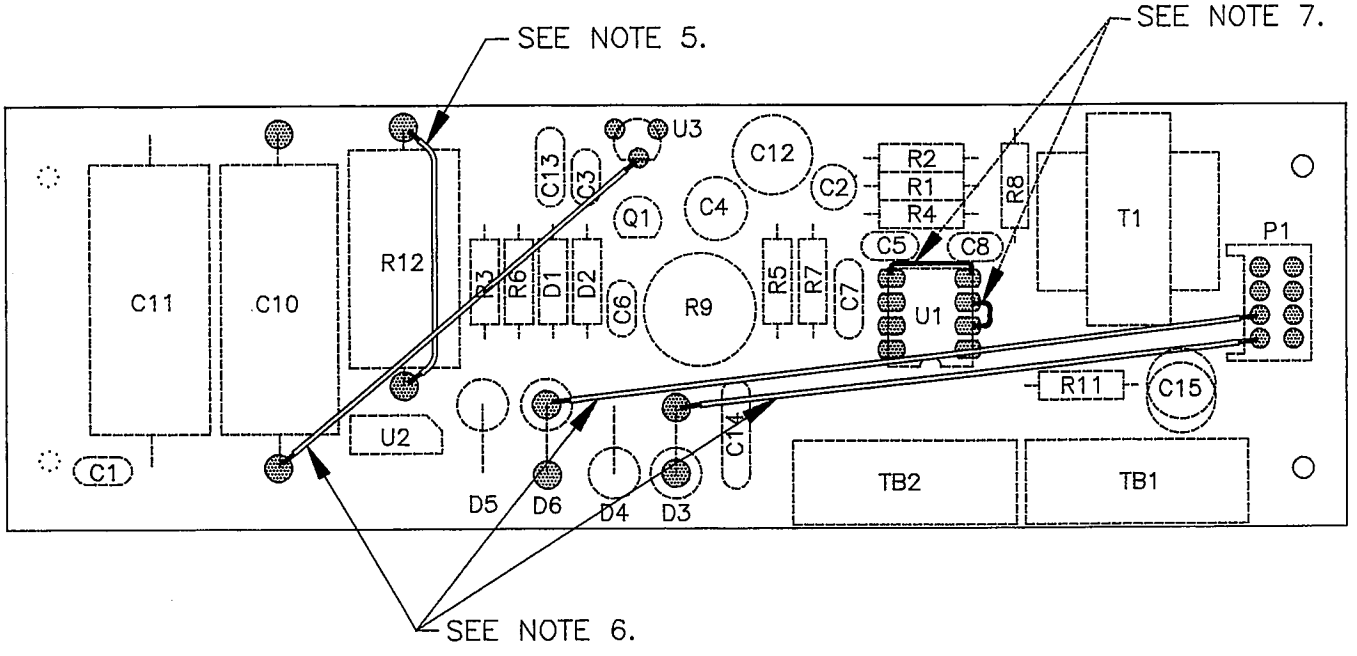


TRACE CUTS
LOOKING FROM CIRCUIT SIDE OF PCB

APPENDIX A

SS2000 Microphone Preamplifier Board Engineering Updates

4. Scrape away the solder mask on the trace of R12 to make solder pads for a new resistor.
5. Install a #22 AWG wire with a teflon sleeve on the component side of the board where resistor R12 used to be.
6. Add 3 #24 AWG jumper wires to the circuit side of the board.
7. Add a bus wire between U1 pins 4 & 5.

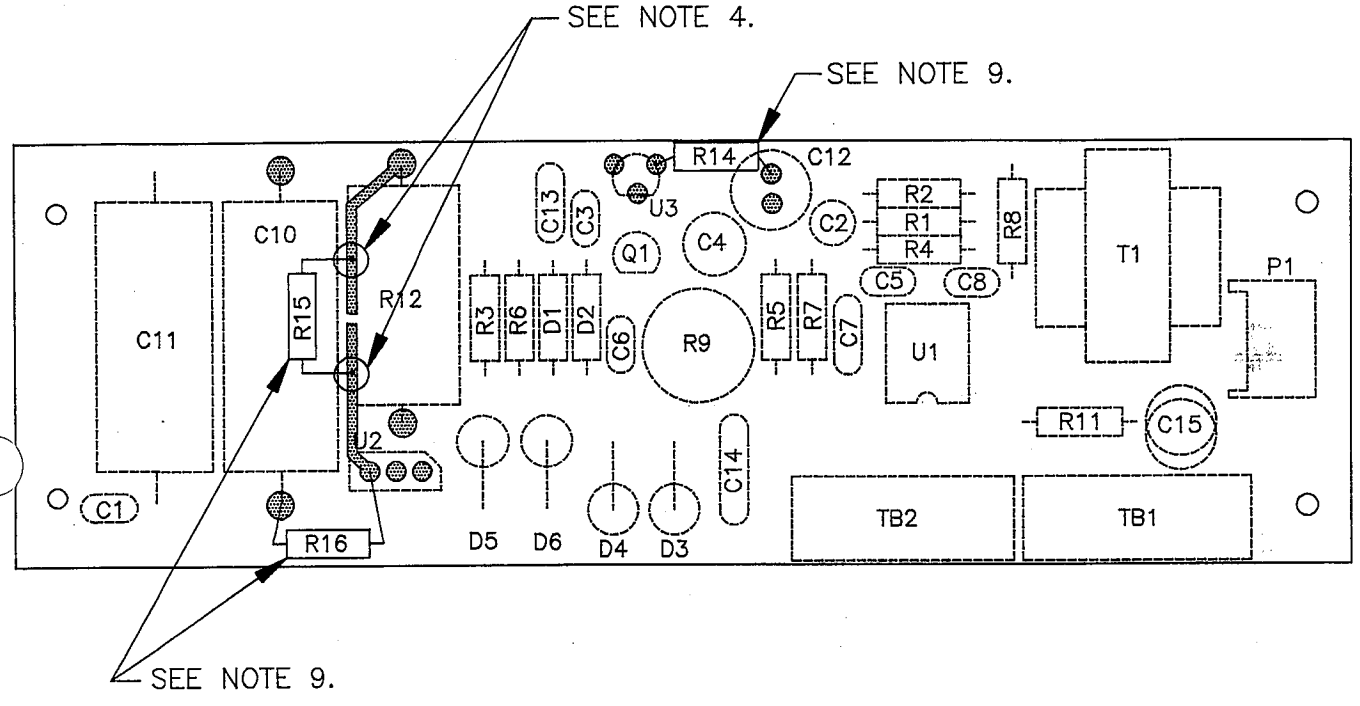


JUMPER WIRE ADDITIONS
LOOKING FROM CIRCUIT SIDE OF PCB

APPENDIX A

SS2000 Microphone Preamplifier Board Engineering Updates

8. Add the following resistors to the circuit side of the board:
   R14 (220ohm)
   R15 (1.1K)
   R16 (9.1K)



RESISTOR ADDITIONS
LOOKING FROM CIRCUIT SIDE OF PCB

9. Securely fasten the modified SS2000 back onto the control station.
10. Reconnect the power supply and microphone cables to their correct positions.
11. Connect the control staion to the system.

APPENDIX A
SS2000 Microphone Preamplifier Board Engineering Updates

Notes:

APPENDIX B

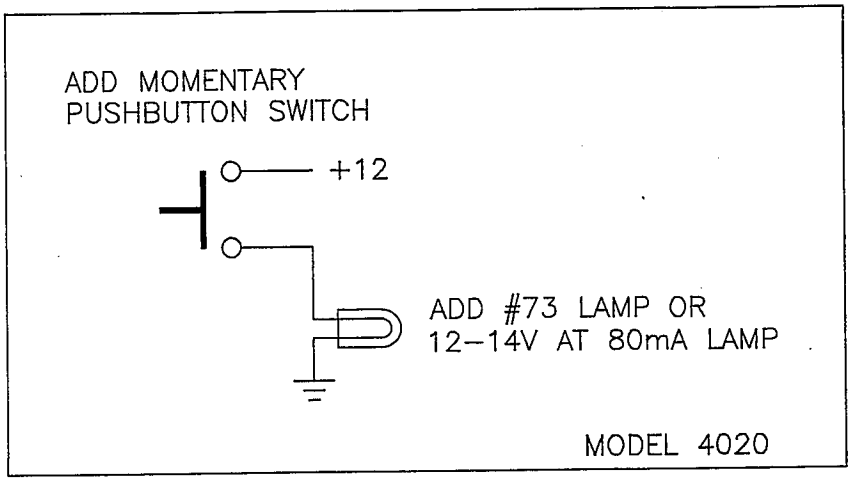


Figure B-1
Return IFB Model 4020 Modifications

Notes:

NOTES

The following list consists of manufacturers names and earphones, earsets and headsets recommended for use with the Series 4000 IFB System's Model 4020 User Station

Sennheiser

Model #	Description
HD-404	Earphone, 17 ohms, 70 ohms, 200 ohms
HD-4004-6	Earphone, Stethscope style Mono 17 ohms, 70 ohms
HD-44-6	Earphone, Stethoscope style Stereo 17 ohms, 70 ohms

Beyer

DT-301.16	Earphone, 50 ohms, 600 ohms
DT-505	Earphone, 15ohms, 200 ohms
DT-109	Headset, 50 ohms dual Headphones, noise cancel mic
DT-108	Headset, 50 ohms single Headphone, noise cancel mic
DT-98	Headset, 200 ohms dual Headphones, noise cancel mic
DT-99	Headset, 200 ohms dual Headphones, noise cancel mic
DT-102	Headphone, 200 ohm single Headphone
DT-509	Headphone, Stethoscope style, Mono 100 ohms

Telex

61563-12	Earset, 500 ohms w/left ear mold; 6' cable w/vol cont.
61563-13	Earset, 500 ohms w/ right ear mold; 6' cable w/vol cont.
61563-16	Earset, 500 ohms w/left ear mold; 5' cable
61563-17	Earset, 500 ohms w/right ear mold; 5' cable
CS-90	Sportcaster Headset 6000 ohms dual headphone; omni mic

AKG

K-2000	Headphone, 2000 ohms
K-158	Headset, 200 ohms dual Headphones; noise cancel mic

UNEX

THS-5	Headset, 600 ohms single headphone; 200 ohm mic
THS-7	Headset, 600 ohms dual headphones; 200 ohm mic

NOTES (continued)

Shure

SM12	Mini Headset, 2000 ohm single earphone; omni mic

Astrolite

MHS-11	Mini Headset, 600 ohms single earphone; omni microphone

Roanwell

490-150-001-694	Commentators Headset, 300 ohm single headphone; noise cancel mic
491-150-001-694	Commentators Headset, 300 ohm dual headphones; noise cancel mic

Philmore

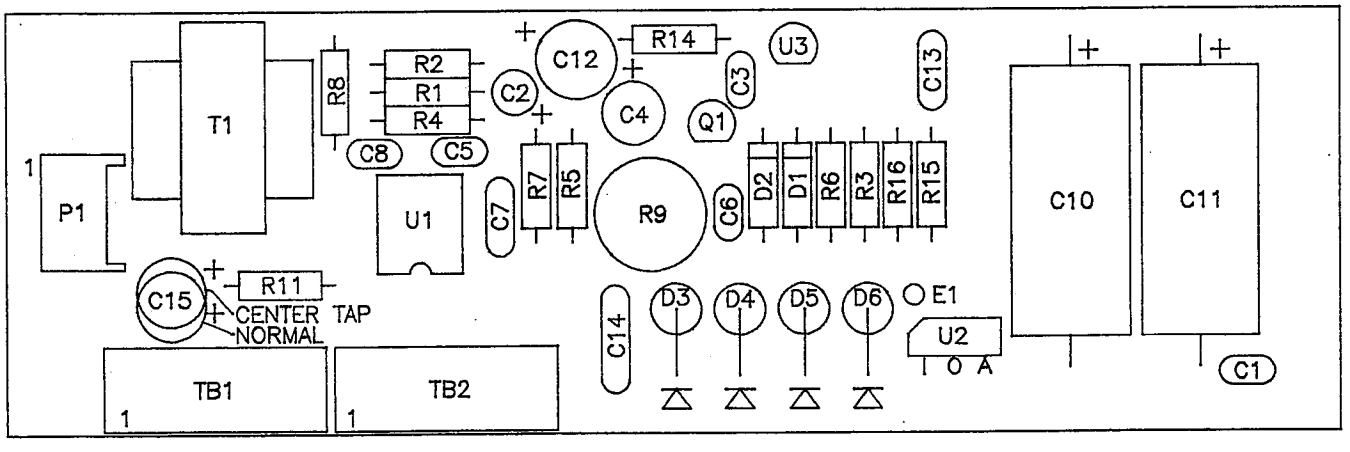
P8	Earphone, 15 ohms
750	Earphone 8 ohms stethscope style

SECTION 7: DIAGRAMS

RTS Systems Document Number	Size	Title	Page
AS1999	A	Assembly Diagram, P.C.B. Mic Pre, Control Panel, IFB System, Model 4000	7-3
AS5123	A	Assembly Diagram, P.C.B., Mic Pre, Modifications To Update Rev C Artwork, Model 4000	7-4
WD2449	A	Wiring Diagram, IFB System, Series 4000, sheet 1 of 2	7-5
WD2449	A	Wiring Diagram, IFB System, Series 4000, sheet 2 of 2	7-6
ID2466	A	Installation Dimensions, Models 4001, 4001M, IFB Control Panel	7-7
ID2464	A	Installation Dimensions, Models 4002, 4002M, IFB Control Panel	7-8
ID2467	A	Installation Dimensions, Models 4003, 4003M, IFB Control Panel	7-9
ID2465	A	Installation Dimensions, Model 4010, IFB Central Electronics	7-0
ID2468	A	Installation Dimensions, Model 4020, IFB User Station, Outline	7-11
SD1905	A	Schematic Diagram, User Station, IFB System, Model 4020	7-12
LD4307	A	Line Drawing, Connecting Block, Model 4022	7-13
LD4308	A	Line Drawing, Connecting Block, Model 4025A	7-14
SD2043	B	Schematic Diagram, IFB System, Control Station, Model 4001-4003, Sheet 1 of 2	7-15
SD2043	B	Schematic Diagram, IFB System, Control Station, Model 4001-4003, Sheet 2 of 2	7-16
SS1973	B	Silkscreen Master, P.C.B., IFB Central Electronics, Model 4010	7-17
AS4377	B	Assembly Diagram, Control Panel, 12 Station, IFB System, Model 4003	7-18
SD1914	B	Schematic Diagram, IFB Central Electronics, Model 4010	7-19

(This section revised March 1991).

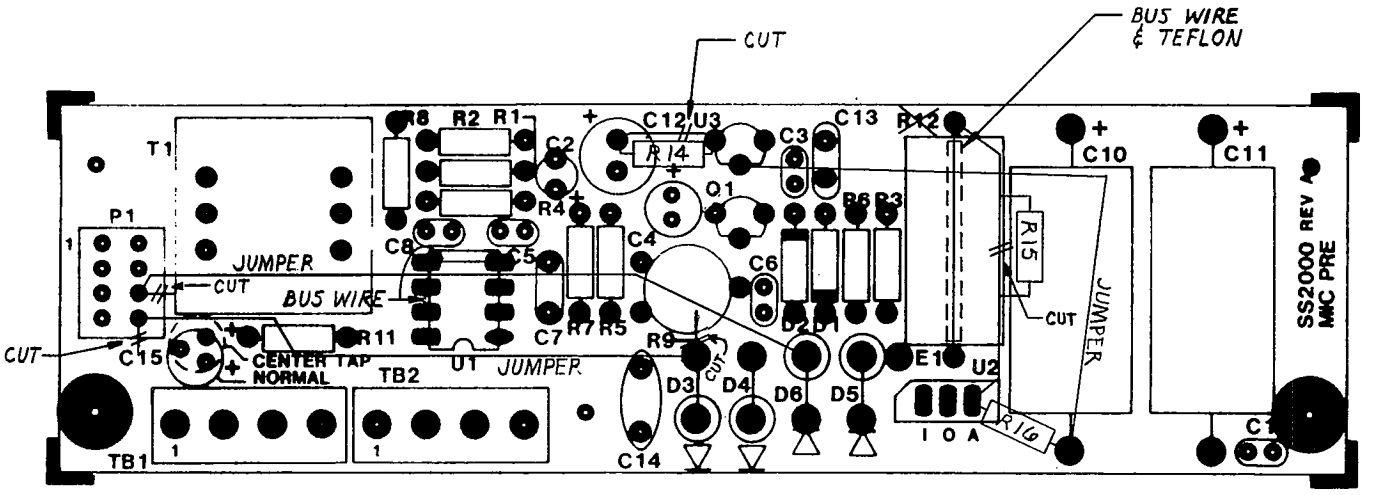
Notes:



AS1999,
Assembly Diagram, P.C.B. Mic Pre, Control Panel, IFB System, Model 4000

AS5123,
Assembly Diagram, P.C.B., Mic Pre, Modifications To Update Rev C Artwork, Model 4000

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



7. ADD BUS WIRE JUMPER BETWEEN U1 PINS 4 & 5.
6. ADD TO CIRCUIT SIDE: R14 (220Ω), R15 (1.1K), R16 (9.1K).
   NOTE: SCRAPE AWAY SOLDER MASK ON TRACE TO MAKE SOLDER PADS FOR R15.
5. ADD BUS WIRE JUMPER BETWEEN U1 PINS 6 & 7.
4. ADD #24 AWG GRAY JUMPER TO CIRCUIT SIDE (3 PLACES).
3. CUT TRACE (5 PLACES).
2. REMOVE R12. PUT A #22 AWG BUS WIRE WITH A TEFLON SLEEVE IN ITS PLACE (COMPONENT SIDE).
1. FOR PART NUMBERS AND DESCRIPTIONS SEE PL 9030-1999-00.

NOTES:

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS XX XXX ANGLES	CONTRACT NO PRODUCT LINE		
MATERIAL	APPROVALS	DATE	ASSY-P.C.B. MIC-PRE, IFB 4000, MODIFICATIONS TO UPDATE REV C ARTWORK
FINISH	DRAWN R. NEILSON	10-27-86	SIZE B FSCM NO 60572 DWG NO AS 5123 REV
DO NOT SCALE DRAWING	CHECKED		SCALE 2:1 SHEET
	ISSUED		

IFB SYSTEM, SERIES 4000 WIRING DIAGRAM

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED

Model 4001	9020-2438-00 Cable	4015-XX Cable	4025 Splitter	4015-XX Cable	9020-2141-00	4010
Control Station 1 (priority 1) control signals						
SW1---J3,1 ---->	>P3,1-----J16,1--->	>P1,1------P2,1--->	>J1,1-------J5,1-->	>P1,1-------P2,1-->	>J7,1------P1,1---<	<J1,1
SW2---J3,2 ---->	>P3,2-----J16,26-->	>P1,26-----P2,26-->	>J1,26------J5,26->	>P1,26------P2,26->	>J7,26-----P1,2---<	<J1,2
SW3---J3,3 ---->	>P3,3-----J16,2--->	>P1,2------P2,2--->	>J1,2-------J5,2-->	>P1,2-------P2,2-->	>J7,2------P1,3---<	<J1,3
SW4---J3,4 ---->	>P3,4-----J16,27-->	>P1,27-----P2,27-->	>J1,27------J5,27->	>P1,27------P2,27->	>J7,27-----P1,4---<	<J1,4
SW5---J3,5 ---->	>P3,5-----J16,3--->	>P1,3------P2,3--->	>J1,3-------J5,3-->	>P1,3-------P2,3-->	>J7,3------P1,5---<	<J1,5
COM---J3,6 ---->	>P3,6-----J16,28-->	>P1,28-----P2,28-->	>J1,28------J5,28->	>P1,28------P2,28->	>J7,28-----P1,6---<	<J1,6
AUD---J3,7 ---->	>P3,7-----J16,4--->	>P1,4------P2,4--->	>J1,4-------J5,4-->	>P1,4-------P2,4-->	>J7,4------P1,7---<	<J1,7
AUD---J3,8 ---->	>P3,8-----J16,29-->	>P1,29-----P2,29-->	>J1,29------J5,29->	>P1,29------P2,29->	>J7,29-----P1,8---<	<J1,8
COM---J3,9 ---->	>P3,9-----J16,5--->	>P1,5------P2,5--->	>J1,5-------J5,5-->	>P1,5-------P2,5-->	>J7,5------P1,9---<	<J1,9
COM---J3,10---->	>P3,10----J16,30-->	>P1,30-----P2,30-->	>J1,30------J5,30->	>P1,30------P2,30->	>J7,30-----P1,10--<	<J1,10
Tally						
SW1---J2,1 ---->	>P2,1-----J16,21-->	>P1,21-----P2,21-->	>J1,21------J5,21->	>P1,21-----P2,21-->	>J7,21-----P5,1---<	<J5,1
SW2---J2,2 ---->	>P2,2-----J16,46-->	>P1,46-----P2,46-->	>J1,46------J5,46->	>P1,46------P2,46->	>J7,46-----P5,2---<	<J5,2
SW3---J2,3 ---->	>P2,3-----J16,22-->	>P1,22-----P2,22-->	>J1,22------J5,22->	>P1,22------P2,22->	>J7,22-----P5,3---<	<J5,3
SW4---J2,4 ---->	>P2,4-----J16,47-->	>P1,47-----P2,47-->	>J1,47------J5,47->	>P1,47------P2,47->	>J7,47-----P5,4---<	<J5,4
SW5---J2,5 ---->	>P2,5-----J16,23-->	>P1,23-----P2,23-->	>J1,23------J5,23->	>P1,23------P2,23->	>J7,23-----P5,5---<	<J5,5
SW6---J2,6 ---->	>P2,6-----J16,48-->	>P1,48-----P2,48-->	>J1,48------J5,48->	>P1,48------P2,48->	>J7,48-----P5,6---<	<J5,6
COM---J2,7 ---->	>P2,7-----J16,24-->	>P1,24-----P2,24-->	>J1,24------J5,24->	>P1,24------P2,24->	>J7,24-----P5,7---<	<J5,7
COM---J2,8 ---->	>P2,8-----J16,49-->	>P1,49-----P2,49-->	>J1,49------J5,49->	>P1,49------P2,49->	>J7,49-----P5,8---<	<J5,8
COM---J2,9 ---->	>P2,9-----J16,25-->	>P1,25-----P2,25-->	>J1,25------J5,25->	>P1,25------P2,25->	>J7,25-----P5,9---<	<J5,9
COM---J2,10---->	>P2,10----J16,50-->	>P1,50-----P2,50-->	>J1,50------J5,50->	>P1,50------P2,50->	>J7,50-----P5,10--<	<J5,10
Control Station 2 (priority 2) control signals						
SW1----J3,1---->	>P3,1------J16,6-->	>P1,6-------P2,6-->	>J2,6-------J5,6-->	>P1,6-------P2,6-->	>J7,6-------P2,1--<	<J2,1
SW2----J3,2---->	>P3,2------J16,31->	>P1,31------P2,31->	>J2,31------J5,31->	>P1,31------P2,31->	>J7,31------P2,2--<	<J2,2
SW3----J3,3---->	>P3,3------J16,7-->	>P1,7-------P2,7-->	>J2,7-------J5,7-->	>P1,7-------P2,7-->	>J7,7-------P2,3--<	<J2,3
SW4----J3,4---->	>P3,4------J16,32->	>P1,32------P2,32->	>J2,32------J5,32->	>P1,32------P2,32->	>J7,32------P2,4--<	<J2,4
SW5----J3,5---->	>P3,5------J16,8-->	>P1,8-------P2,8-->	>J2,8-------J5,8-->	>P1,8-------P2,8-->	>J7,8-------P2,5--<	<J2,5
COM----J3,6---->	>P3,6------J16,33->	>P1,33------P2,33->	>J2,33------J5,33->	>P1,33------P2,33->	>J7,33------P2,6--<	<J2,6
AUD----J3,7---->	>P3,7------J16,9-->	>P1,9-------P2,9-->	>J2,9-------J5,9-->	>P1,9-------P2,9-->	>J7,9-------P2,7--<	<J2,7
AUD----J3,8---->	>P3,8------J16,34->	>P1,34------P2,34->	>J2,34------J5,34->	>P1,34------P2,34->	>J7,34------P2,8--<	<J2,8
COM----J3,9---->	>P3,9------J16,10->	>P1,10------P2,10->	>J2,10------J5,10->	>P1,10------P2,10->	>J7,10------P2,9--<	<J2,9
COM----J3,10--->	>P3,10-----J16,35->	>P1,35------P2,35->	>J2,35------J5,35->	>P1,35------P2,35->	>J7,35------P2,10-<	<J2,10
Tally						
SW1----J2,1---->	>P2,1------J16,21->	>P1,21------P2,21->	>J2,21------J5,21->	>P1,21------P2,21->	>J7,21------P5,1--<	<J5,1
SW2----J2,2---->	>P2,2------J16,46->	>P1,46------P2,46->	>J2,46------J5,46->	>P1,46------P2,46->	>J7,46------P5,2--<	<J5,2
SW3----J2,3---->	>P2,3------J16,22->	>P1,22------P2,22->	>J2,22------J5,22->	>P1,22------P2,22->	>J7,22------P5,3--<	<J5,3
SW4----J2,4---->	>P2,4------J16,47->	>P1,47------P2,47->	>J2,47------J5,47->	>P1,47------P2,47->	>J7,47------P5,4--<	<J5,4
SW5----J2,5---->	>P2,5------J16,23->	>P1,23------P2,23->	>J2,23------J5,23->	>P1,23------P2,23->	>J7,23------P5,5--<	<J5,5
SW6----J2,6---->	>P2,6------J16,48->	>P1,48------P2,48->	>J2,48------J5,48->	>P1,48------P2,48->	>J7,48------P5,6--<	<J5,6
COM----J2,7---->	>P2,7------J16,24->	>P1,24------P2,24->	>J2,24------J5,24->	>P1,24------P2,24->	>J7,24------P5,7--<	<J5,7
COM----J2,8---->	>P2,8------J16,49->	>P1,49------P2,49->	>J2,49------J5,49->	>P1,49------P2,49->	>J7,49------P5,8--<	<J5,8
COM----J2,9---->	>P2,9------J16,25->	>P1,25------P2,25->	>J2,25------J5,25->	>P1,25------P2,25->	>J7,25------P5,9--<	<J5,9
COM----J2,10--->	>P2,10-----J16,50->	>P1,50------P2,50->	>J2,50------J5,50->	>P1,50------P2,50->	>J7,50------P5,10-<	<J5,10

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±	CONTRACT NO. PRODUCT LINE		
		MATERIAL	APPROVALS	DATE	WIRING DIAGRAM - IFB SYSTEM, SERIES 4000
			DRAWN DFR	6/18/80	
		FINISH	CHECKED R. BOOTH	6/18/80	SIZE B FSCM NO. 60572 DWG. NO. WD 2449 REV.
NEXT ASSY	USED ON		ISSUED		
APPLICATION		DO NOT SCALE DRAWING			SCALE — SHEET 1 OF 2

WD2449,
Wiring Diagram, IFB System, Series 4000, sheet 1 of 2

IFB SYSTEM, SERIES 4000 WIRING DIAGRAM

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED

Model 4001	9020-2438-00 Cable	4015-XX Cable	4025 Splitter	4015-XX Cable	9020-2141-00	4010
Control Station 3 (priority 3) control signals						
SW1----J3,1---->	>P3,1------J16,11->	>P1,11------P2,11->	>J3,11------J5,11->	>P1,11------P2,11->	>J7,11------P3,1--<	<J3,1
SW2----J3,2---->	>P3,2------J16,36->	>P1,36------P2,36->	>J3,36------J5,36->	>P1,36------P2,36->	>J7,36------P3,2--<	<J3,2
SW3----J3,3---->	>P3,3------J16,12->	>P1,12------P2,12->	>J3,12------J5,12->	>P1,12------P2,12->	>J7,12------P3,3--<	<J3,3
SW4----J3,4---->	>P3,4------J16,37->	>P1,37------P2,37->	>J3,37------J5,37->	>P1,37------P2,37->	>J7,37------P3,4--<	<J3,4
SW5----J3,5---->	>P3,5------J16,13->	>P1,13------P2,13->	>J3,13------J5,13->	>P1,13------P2,13->	>J7,13------P3,5--<	<J3,5
COM----J3,6---->	>P3,6------J16,38->	>P1,38------P2,38->	>J3,38------J5,38->	>P1,38------P2,38->	>J7,38------P3,6--<	<J3,6
AUD----J3,7---->	>P3,7------J16,14->	>P1,14------P2,14->	>J3,14------J5,9-->	>P1,14------P2,14->	>J7,14------P3,7--<	<J3,7
AUD----J3,8---->	>P3,8------J16,39->	>P1,39------P2,39->	>J3,39------J5,39->	>P1,39------P2,39->	>J7,39------P3,8--<	<J3,8
COM----J3,9---->	>P3,9------J16,15->	>P1,15------P2,15->	>J3,15------J5,15->	>P1,15------P2,15->	>J7,15------P3,9--<	<J3,9
COM----J3,10--->	>P3,10-----J16,40->	>P1,40------P2,40->	>J3,40------J5,40->	>P1,40------P2,40->	>J7,40------P3,40-<	<J3,10
Tally						
SW1----J2,1---->	>P2,1------J16,21->	>P1,21------P2,21->	>J3,21------J5,21->	>P1,21------P2,21->	>J7,21------P5,1--<	<J5,1
SW2----J2,2---->	>P2,2------J16,46->	>P1,46------P2,46->	>J3,46------J5,46->	>P1,46------P2,46->	>J7,46------P5,2--<	<J5,2
SW3----J2,3---->	>P2,3------J16,22->	>P1,22------P2,22->	>J3,22------J5,22->	>P1,22------P2,22->	>J7,22------P5,3--<	<J5,3
SW4----J2,4---->	>P2,4------J16,47->	>P1,47------P2,47->	>J3,47------J5,47->	>P1,47------P2,47->	>J7,47------P5,4--<	<J5,4
SW5----J2,5---->	>P2,5------J16,23->	>P1,23------P2,23->	>J3,23------J5,23->	>P1,23------P2,23->	>J7,23------P5,5--<	<J5,5
SW6----J2,6---->	>P2,6------J16,48->	>P1,48------P2,48->	>J3,48------J5,48->	>P1,48------P2,48->	>J7,48------P5,6--<	<J5,6
COM----J2,7---->	>P2,7------J16,24->	>P1,24------P2,24->	>J3,24------J5,24->	>P1,24------P2,24->	>J7,24------P5,7--<	<J5,7
COM----J2,8---->	>P2,8------J16,49->	>P1,49------P2,49->	>J3,49------J5,49->	>P1,49------P2,49->	>J7,49------P5,8--<	<J5,8
COM----J2,9---->	>P2,9------J16,25->	>P1,25------P2,25->	>J3,25------J5,25->	>P1,25------P2,25->	>J7,25------P5,9--<	<J5,9
COM----J2,10--->	>P2,10-----J16,50->	>P1,50------P2,50->	>J3,50------J5,50->	>P1,50------P2,50->	>J7,50------P5,10-<	<J5,10
Control Station 4 (priority 4) control signals						
SW1----J3,1---->	>P3,1------J16,16->	>P1,16------P2,16->	>J4,16------J5,16->	>P1,16------P2,16->	>J7,16------P4,1--<	<J4,1
SW2----J3,2---->	>P3,2------J16,41->	>P1,41------P2,41->	>J4,41------J5,41->	>P1,41------P2,41->	>J7,41------P4,2--<	<J4,2
SW3----J3,3---->	>P3,3------J16,17->	>P1,17------P2,17->	>J4,17------J5,17->	>P1,17------P2,17->	>J7,17------P4,3--<	<J4,3
SW4----J3,4---->	>P3,4------J16,42->	>P1,42------P2,42->	>J4,42------J5,42->	>P1,42------P2,42->	>J7,42------P4,4--<	<J4,4
SW5----J3,5---->	>P3,5------J16,18->	>P1,18------P2,18->	>J4,18------J5,18->	>P1,18------P2,18->	>J7,18------P4,5--<	<J4,5
COM----J3,6---->	>P3,6------J16,43->	>P1,43------P2,43->	>J4,43------J5,43->	>P1,43------P2,43->	>J7,43------P4,6--<	<J4,6
AUD----J3,7---->	>P3,7------J16,19->	>P1,19------P2,19->	>J4,19------J5,19->	>P1,19------P2.19->	>J7,19------P4,7--<	<J4,7
AUD----J3,8---->	>P3,8------J16,44->	>P1,44------P2,44->	>J4,44------J5,44->	>P1,44------P2,44->	>J7,44------P4,8--<	<J4,8
COM----J3,9---->	>P3,9------J16,20->	>P1,20------P2,20->	>J4,20------J5,20->	>P1,20------P2,20->	>J7,20------P4,9--<	<J4,9
COM----J3,10--->	>P3,10-----J16,45->	>P1,45------P2,45->	>J4,45------J5,45->	>P1,45------P2,45->	>J7,45------P4,10-<	<J4,10
Tally						
SW1----J2,1---->	>P2,1------J16,21->	>P1,21------P2,21->	>J4,21------J5,21->	>P1,21------P2,21->	>J7,21------P5,1--<	<J5,1
SW2----J2,2---->	>P2,2------J16,46->	>P1,46------P2,46->	>J4,46------J5,46->	>P1,46------P2,46->	>J7,46------P5,2--<	<J5,2
SW3----J2,3---->	>P2,3------J16,22->	>P1,22------P2,22->	>J4,22------J5,22->	>P1,22------P2,22->	>J7,22------P5,3--<	<J5,3
SW4----J2,4---->	>P2,4------J16,47->	>P1,47------P2,47->	>J4,47------J5,47->	>P1,47------P2,47->	>J7,47------P5,4--<	<J5,4
SW5----J2,5---->	>P2,5------J16,23->	>P1,23------P2,23->	>J4,23------J5,23->	>P1,23------P2,23->	>J7,23------P5,5--<	<J5,5
SW6----J2,6---->	>P2,6------J16,48->	>P1,48------P2,48->	>J4,48------J5,48->	>P1,48------P2,48->	>J7,48------P5,6--<	<J5,6
COM----J2,7---->	>P2,7------J16,24->	>P1,24------P2,24->	>J4,24------J5,24->	>P1,24------P2,24->	>J7,24------P5,7--<	<J5,7
COM----J2,8---->	>P2,8------J16,49->	>P1,49------P2,49->	>J4,49------J5,49->	>P1,49------P2,49->	>J7,49------P5,8--<	<J5,8
COM----J2,9---->	>P2,9------J16,25->	>P1,25------P2,25->	>J4,25------J5,25->	>P1,25------P2,25->	>J7,25------P5,9--<	<J5,9
COM----J2,10--->	>P2,10-----J16,50->	>P1,50------P2,50->	>J4,50------J5,50->	>P1,50------P2,50->	>J7,50------P5,10-<	<J5,10

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX± .XXX± ANGLES ±

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO. PRODUCT LINE

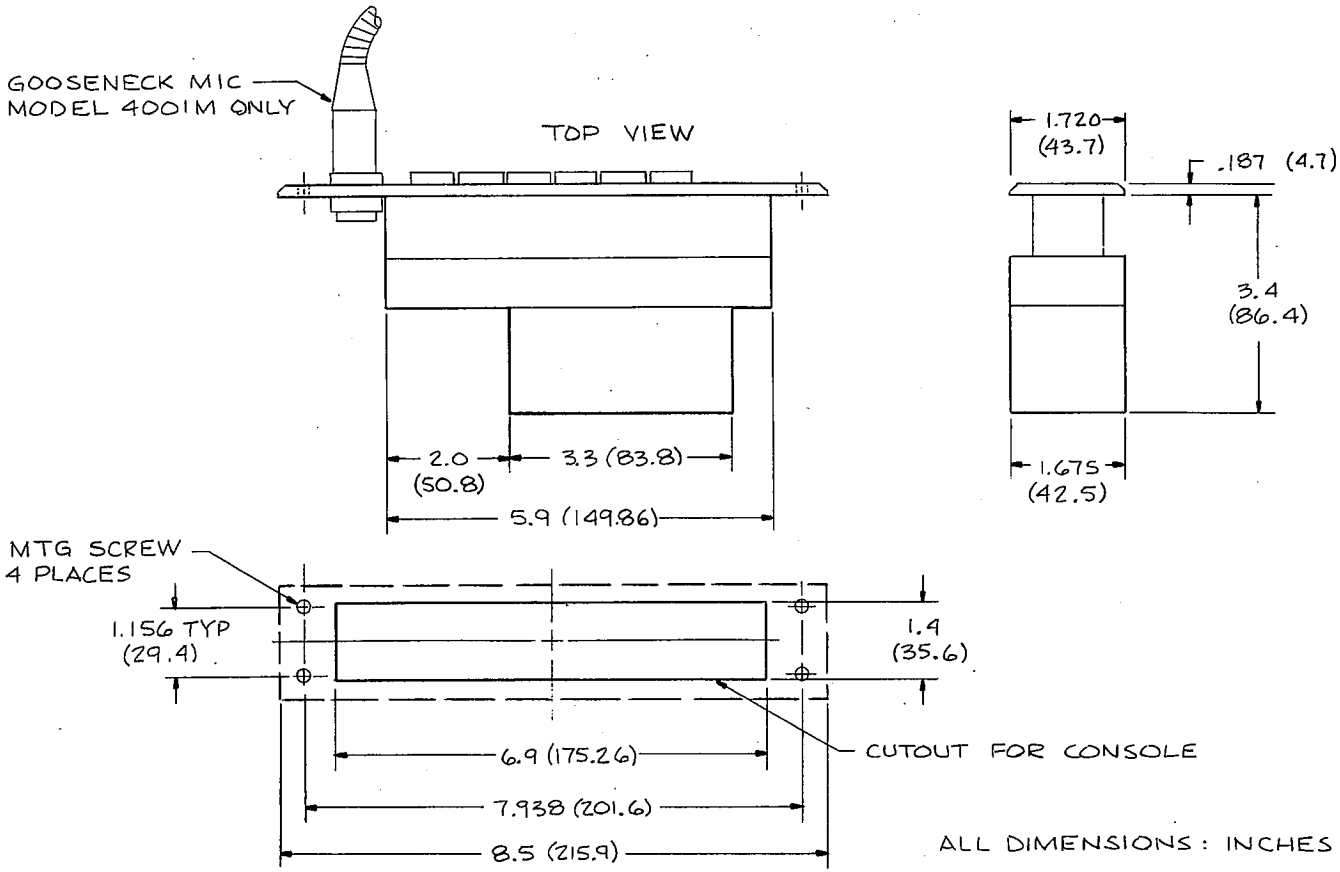
APPROVALS	DATE
DRAWN DFR	6/3/80
CHECKED R.K. BOOTH	6/8/80
ISSUED	

WIRING DIAGRAM - IFB SYSTEM, SERIES 4000

SIZE B | FSCM NO. 60572 | DWG. NO. WD 2449 | REV.

SCALE | SHEET 2

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED



ALL DIMENSIONS: INCHES (mm)

WEIGHTS: 4001 2.1 LBS. (0.953 kg)
4001M 2.7 LBS. (1.225 kg)
POWER PACK (REF.) 1.4 LBS. (0.635 kg)

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±
MATERIAL
FINISH
DO NOT SCALE DRAWING

CONTRACT NO. PRODUCT LINE

APPROVALS	DATE
DRAWN CAMPBELL	7-14-80
CHECKED	
ISSUED	

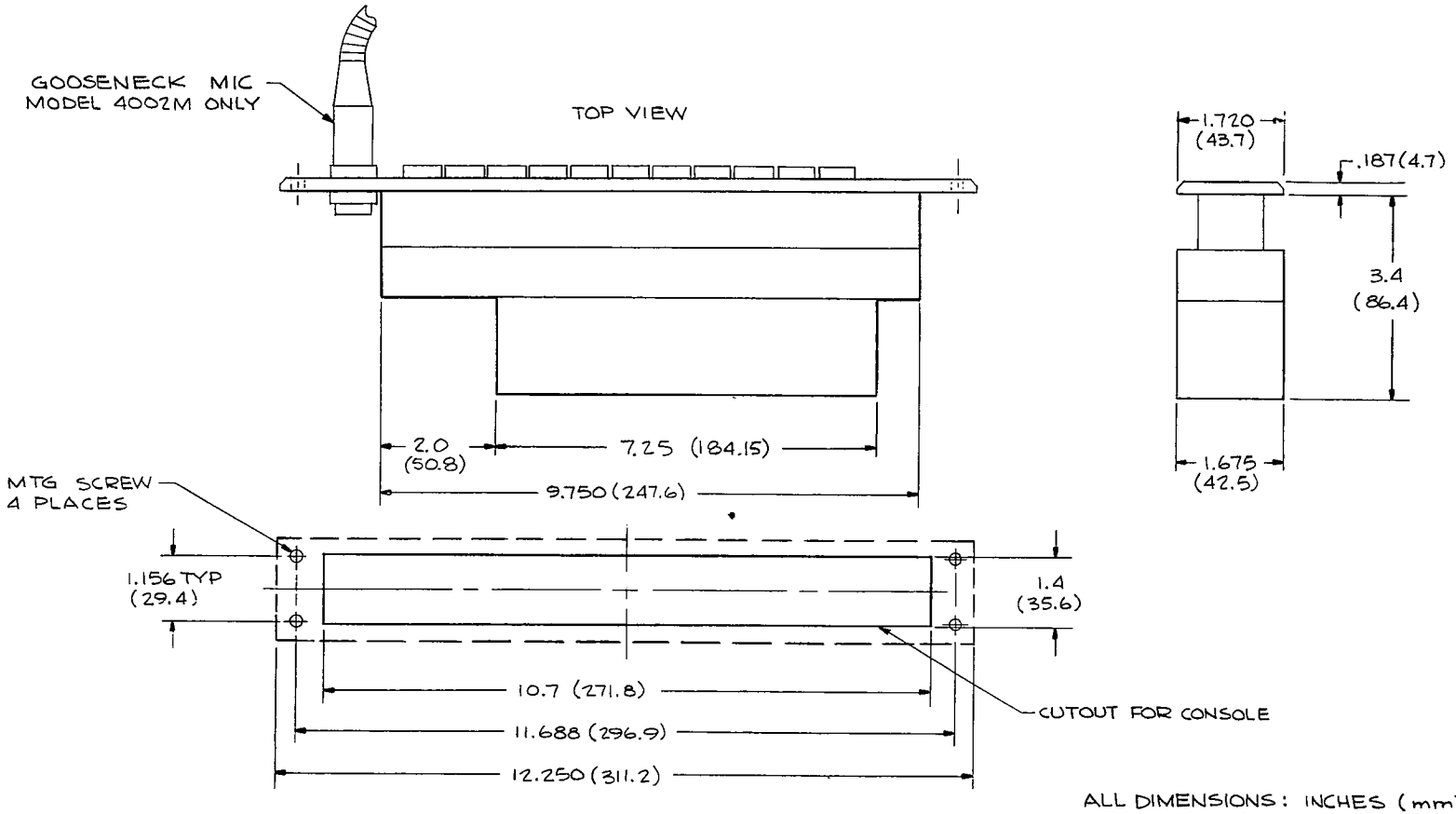
MODELS 4001, 4001M
IFB CONTROL PANEL
INSTALLATION DIMENSIONS

SIZE	FSCM NO.	DWG. NO.	REV.
B	60572	2466	

SCALE — SHEET 1 OF 1

ID2466,
Installation Dimensions, Models 4001, 4001M, IFB Control Panel

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED



ALL DIMENSIONS: INCHES (mm)

WEIGHTS: 4002 2.3 LBS. (1.043 kg)
4002M 2.9 LBS. (1.32 kg)
POWER PACK (REF.) 1.4 LBS. (0.635 kg)

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±
MATERIAL
FINISH
DO NOT SCALE DRAWING

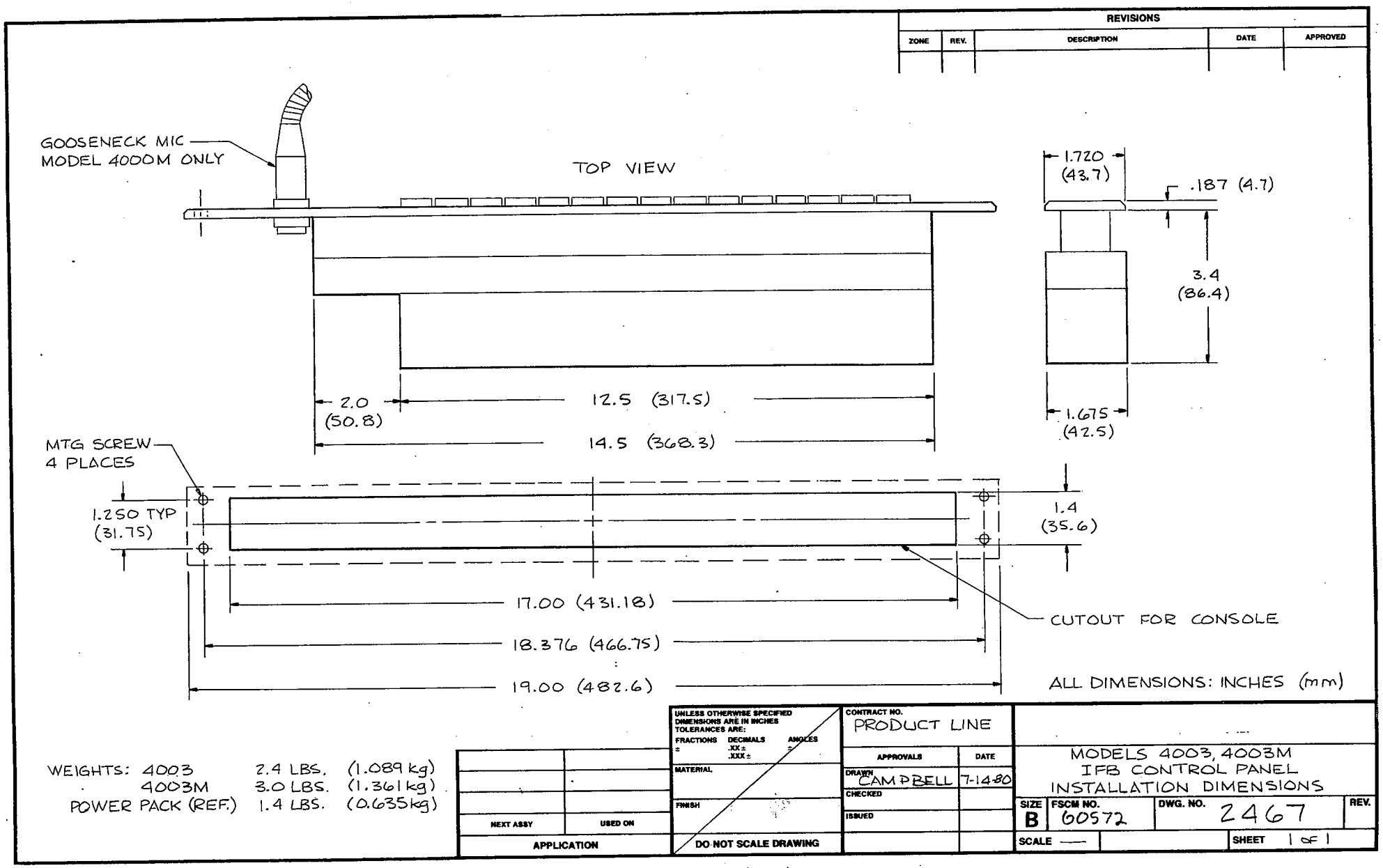
CONTRACT NO. PRODUCT LINE

APPROVALS	DATE
DRAWN CAMPBELL	7-10-80
CHECKED	
ISSUED	

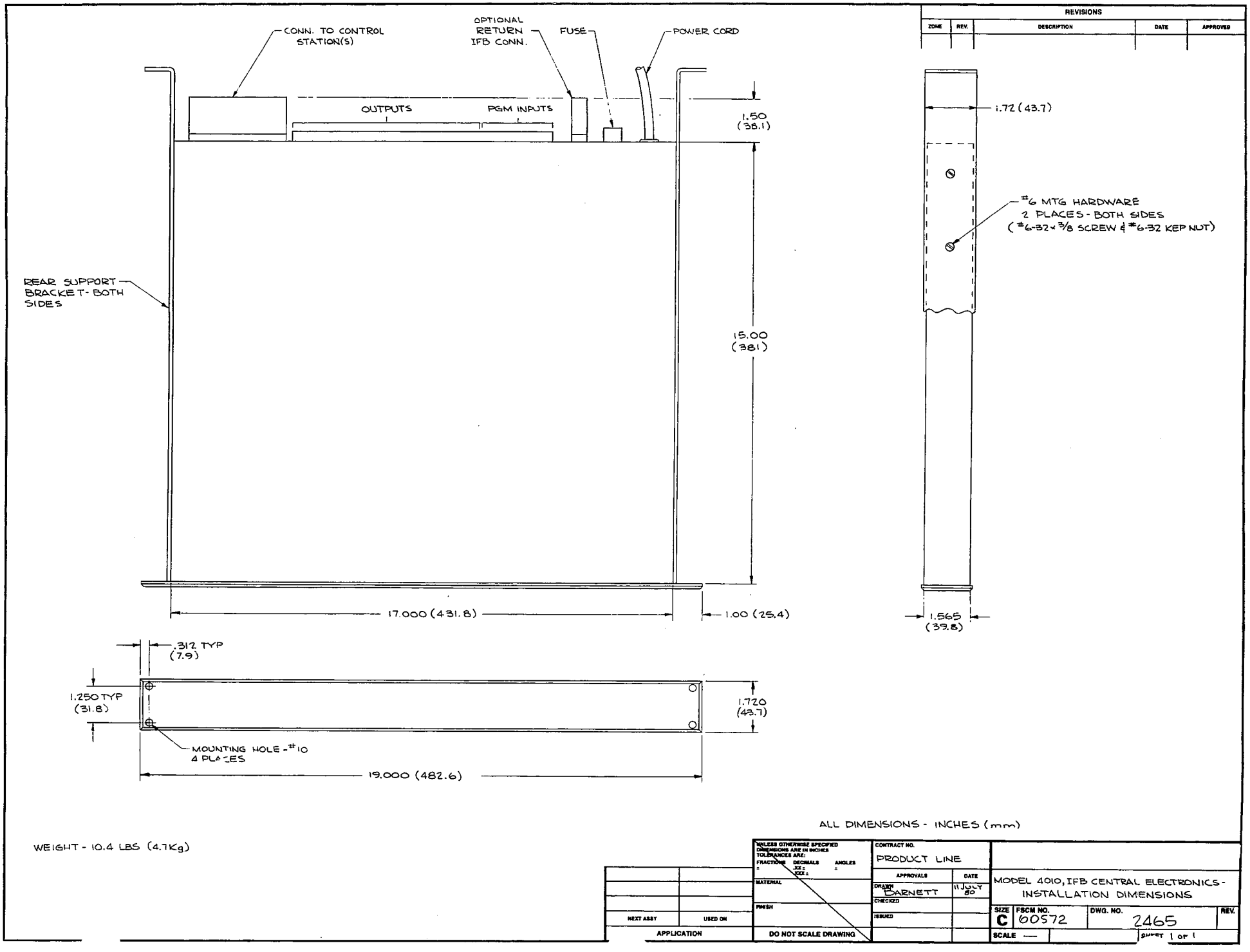
MODELS 4002, 4002M
IFB CONTROL PANEL
INSTALLATION DIMENSIONS

SIZE	FSCM NO.	DWG. NO.	REV.
B	60572	2464	

SCALE — SHEET 1 OF 1



ID2467,
Installation Dimensions, Models 4003, 4003M, IFB Control Panel



REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED

ALL DIMENSIONS - INCHES (mm)

WEIGHT - 10.4 LBS (4.7Kg)

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±
MATERIAL
FINISH
DO NOT SCALE DRAWING

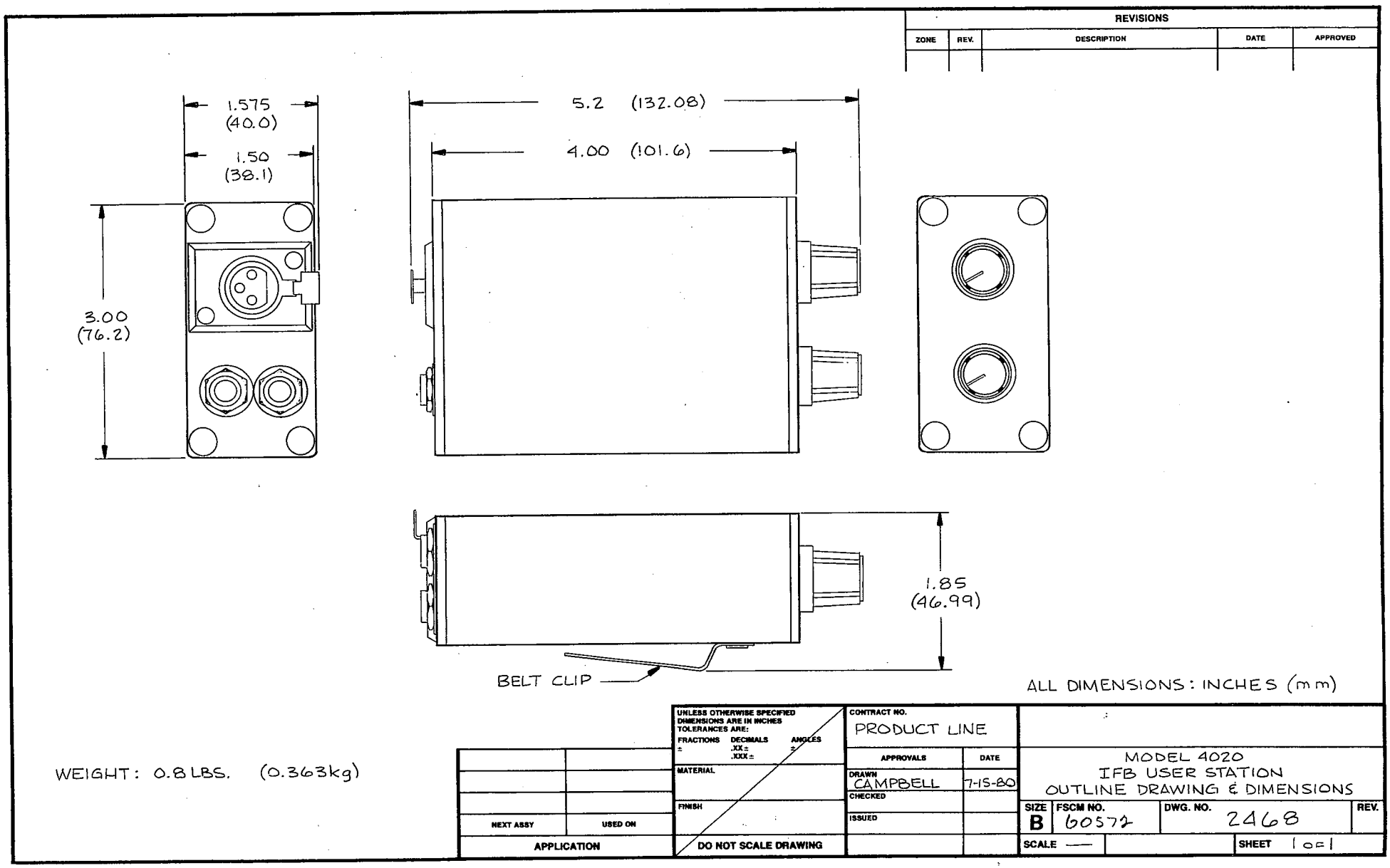
CONTRACT NO.
PRODUCT LINE

APPROVALS	DATE
DRAWN BARNETT	11 JULY 80
CHECKED	
ISSUED	

MODEL 4010, IFB CENTRAL ELECTRONICS - INSTALLATION DIMENSIONS

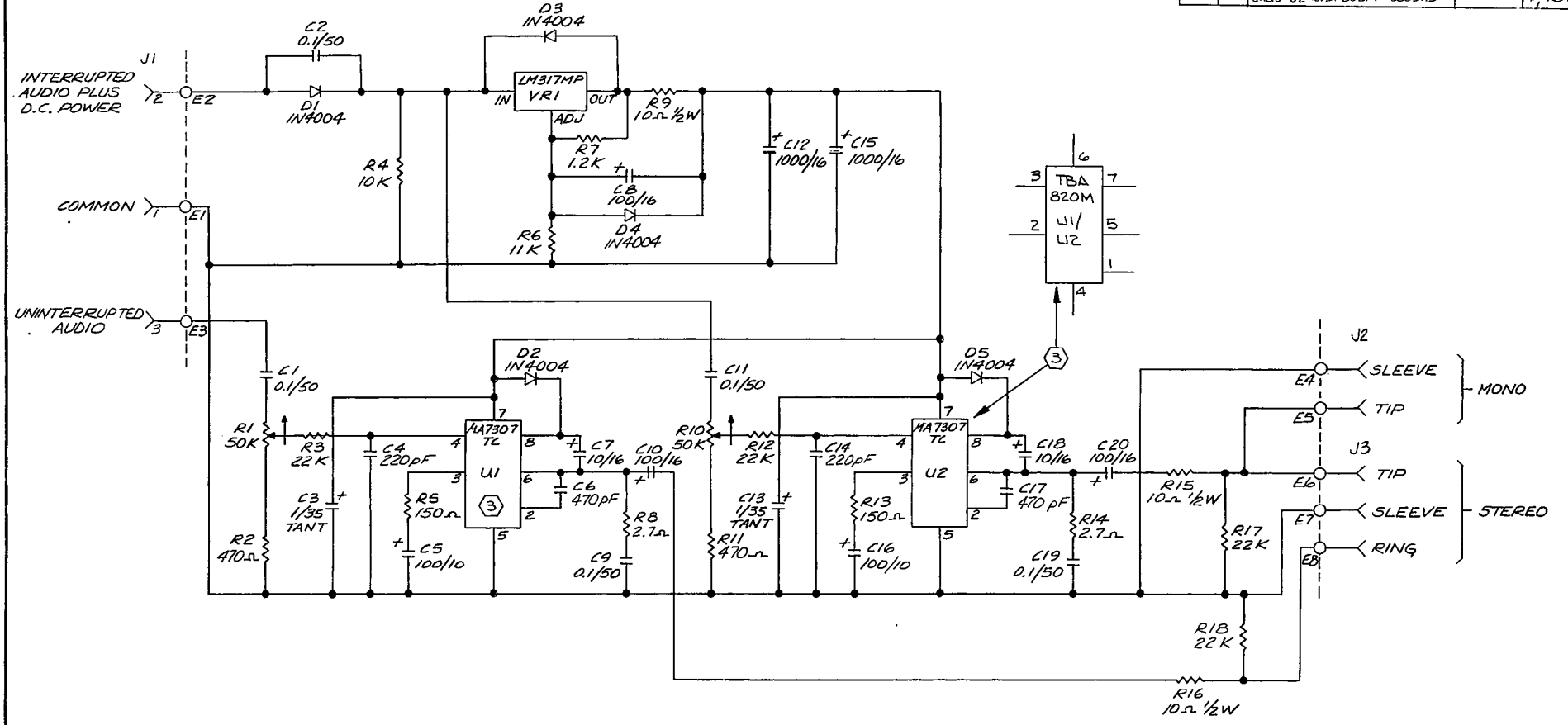
SIZE C | FSCM NO. 60572 | DWG. NO. 2465 | REV.

SCALE — | SHEET 1 OF 1



ID2468,
Installation Dimensions, Model 4020, IFB User Station. Outline

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	CHNG VALUES ON R2, R11, C4, C14 PER ECO #88	1-11-80	
	B	UPDATED PER ECO #155	6-12-80	
	C	ADDED J1, J2, J3 REF. DES	6-19-80	
	D	REV PER ECO #988 B APPROVED	6-29-83	
	E	CHGD NOTE 3; ADDED NOTE 4; CHGD U2 WAS: 80ZM ECO3115	8 6 90	Y.B.



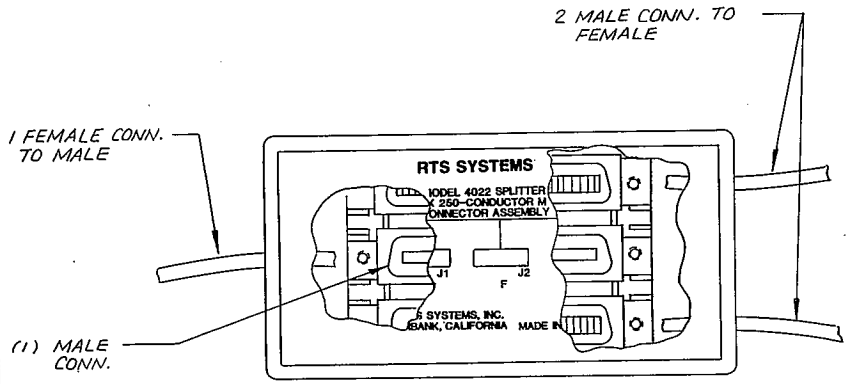
NOTES: (UNLESS OTHERWISE SPECIFIED)

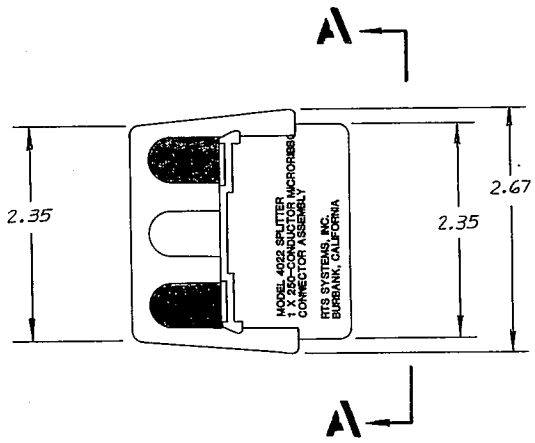
1. ALL RESISTORS ARE CARBON FILM, 1/4 W, ± 5%.
2. CAPACITANCE VALUES ARE SHOWN; MICROFARADS/VOLTS.
3. THE μA7307TC IS NO LONGER AVAILABLE. IF A REPLACEMENT PART IS NEEDED, USE A TBA820M MOUNTED IN AN ADAPTER (RTS P/N 9020-0820-0M). THE TBA820M IS FUNCTIONALLY IDENTICAL TO THE μA7307TC, BUT THE PINOUT IS NOT COMPATIBLE.
4. THIS DRAWING APPLIES TO 4020 UNITS BUILT PRIOR TO 1983.

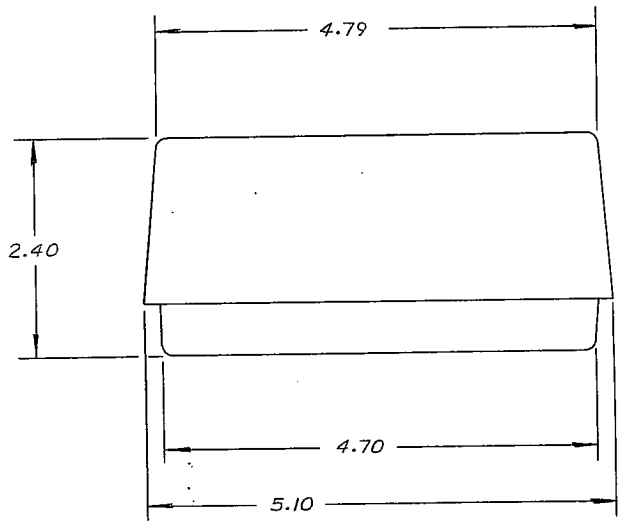
NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±	CONTRACT NO. PRODUCT LINE		SCHEMATIC - USER STATION, IFB, MODEL 4020 (OLD UNITS)
APPLICATION		MATERIAL	APPROVALS	DATE	
		FINISH	DRAWN R.K.BOOTH	11-15-79	SIZE C FSCM NO. 60572 DWG. NO. SD1905 REV. E
		DO NOT SCALE DRAWING	CHECKED Dan R	4/17/80	SCALE — SHEET 1
			ISSUED		

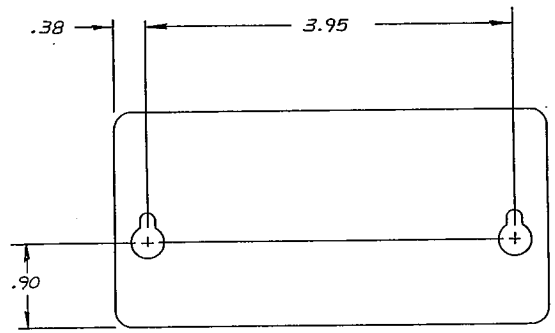
LD4307, Line Drawing, Connecting Block, Model 4022

REVISIONS			
ZONE	REV.	DESCRIPTION	APPROVED





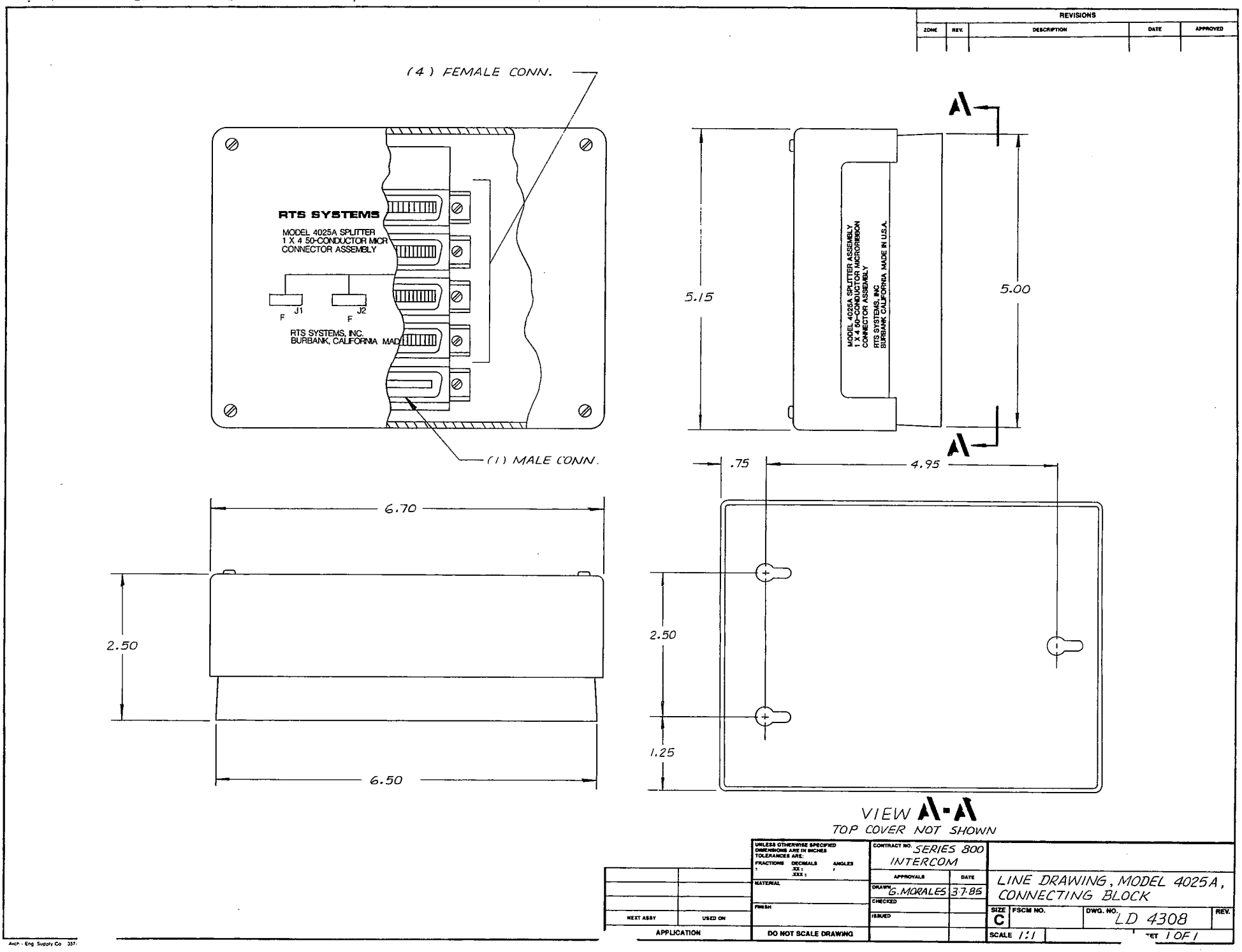




VIEW A-A
TOP COVER NOT SHOWN

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±	CONTRACT NO. SERIES 800 INTERCOM	LINE DRAWING, MODEL 4022 CONNECTING BLOCK	
		MATERIAL	APPROVALS / DATE		
		FINISH	DRAWN G. MORALES 3-6-85		
NEXT ASSY	USED ON		CHECKED		
APPLICATION		DO NOT SCALE DRAWING	ISSUED	SIZE C / FSCM NO. / DWG. NO. LD 4307 / REV.	
				SCALE 1:1	SHEET 1 OF 1

Arch - Eng Supply Co. 357-9681

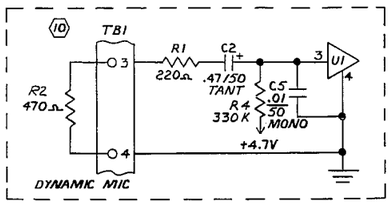


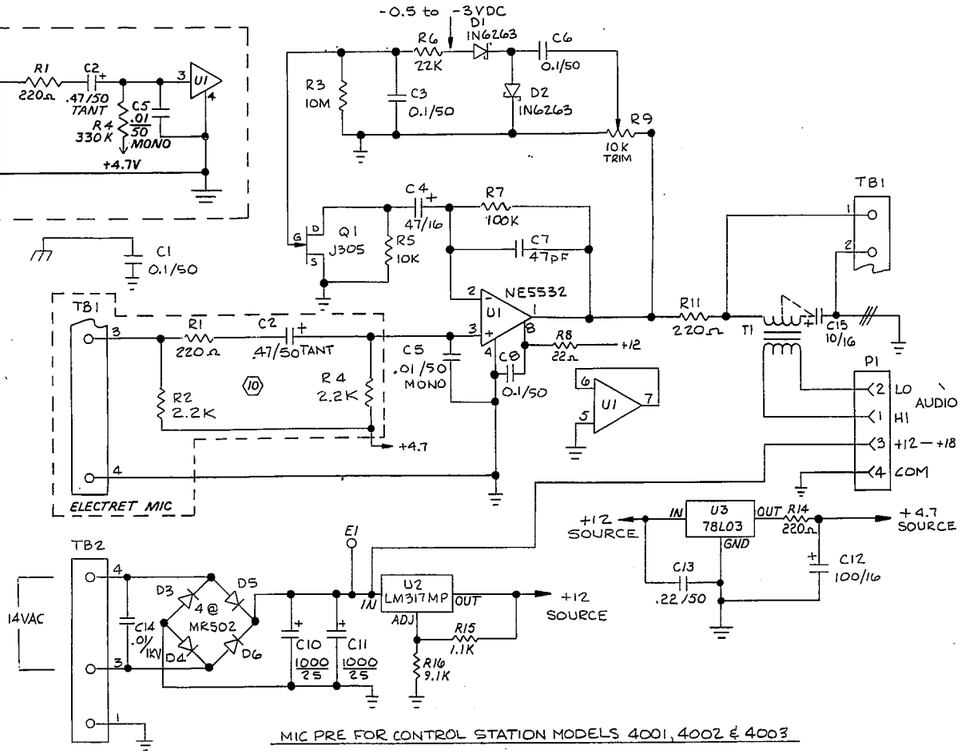
Arch - Eng Supply Co 357-

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	DESIGN UPDATES	5-12-80	
	B	UPDATED PER ECO # 154	6-12-80	
	C	UPDATED PER ECO #163	6-17-80	
	D	ADDED REF. DES. FOR PLUGS P1-P19	7-24-80	
	E	UPDATED PER ECO # 309	11-16-81	
	F	ADDED D156 & NOTE 8 PER ECO #357	17-NOV-81	
	G	UPDATED PER ECO 376	11-23-81	
	H	UPDATED PER ECO 386	12-3-81	
	I	UPDATED PER ECO # 529	2-19-82	
	J	REV'D PER ECO 1150	11-30-83	
	K	REV PER ECO 1446	5-6-85	

CONT. ON SHEET 2

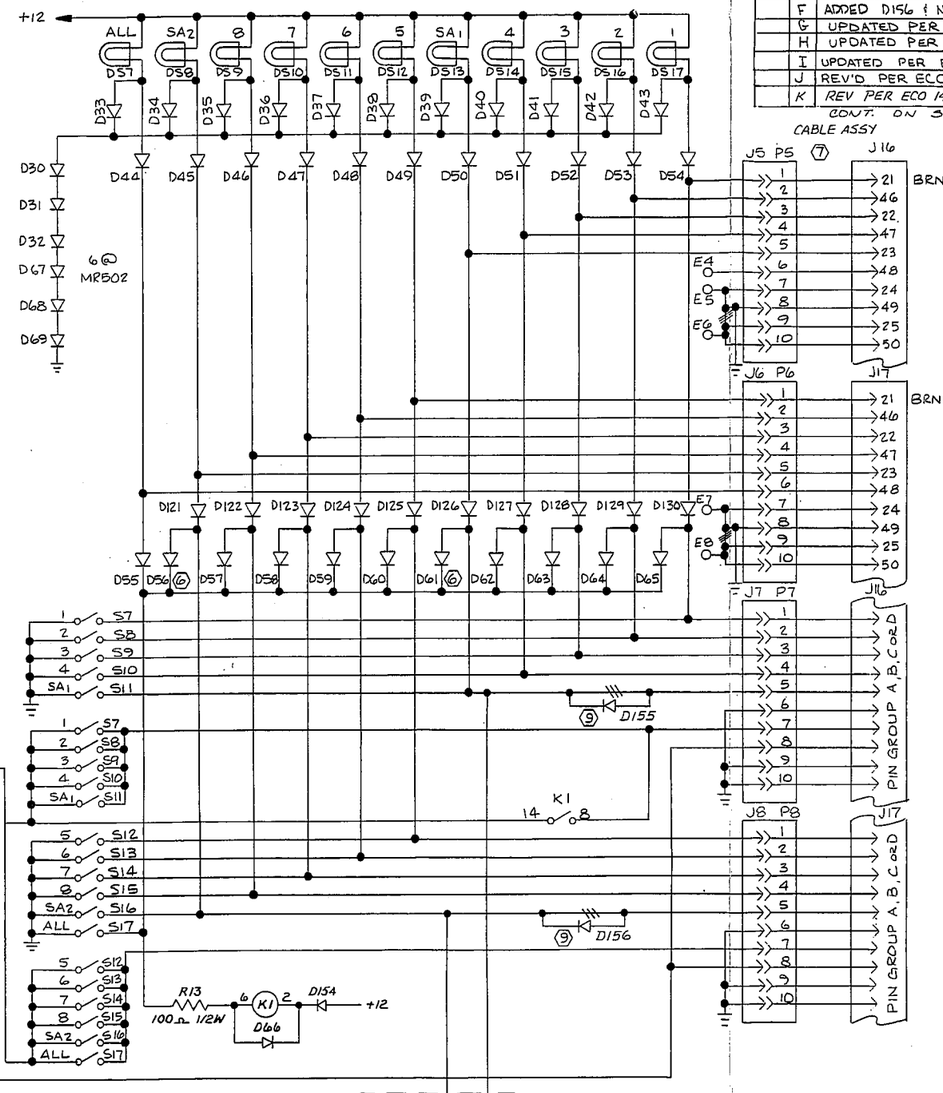
DETAIL A





MIC PRE FOR CONTROL STATION MODELS 4001, 4002 & 4003

FOR CONTROL STATION MODEL 4002



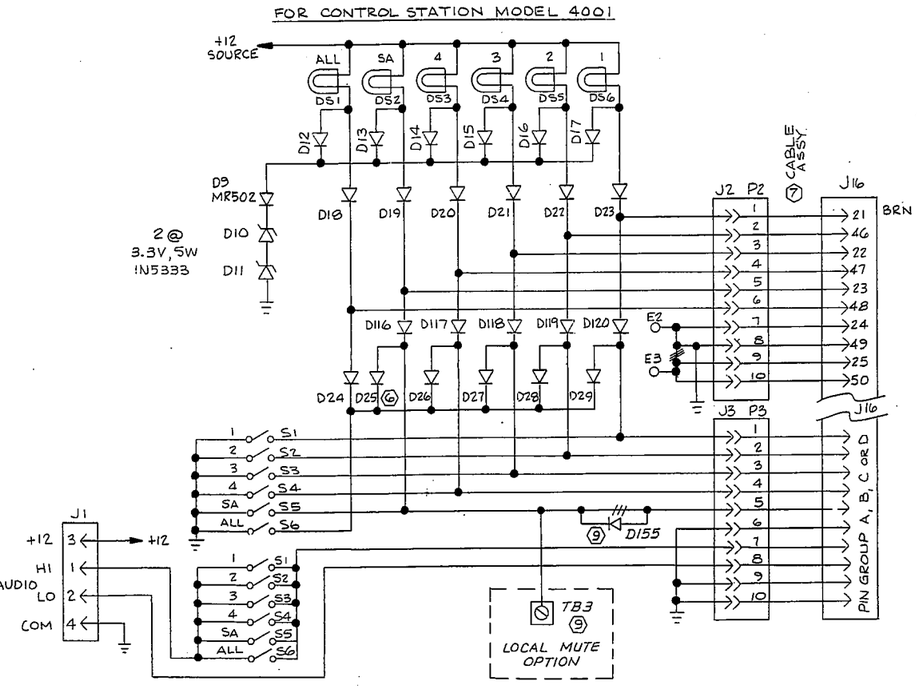
TALLY (1ST IFB CENTRAL)

TALLY (2ND IFB CENTRAL)

SWITCHING TO 1ST IFB CENTRAL

SWITCHING TO 2ND IFB CENTRAL

FOR CONTROL STATION MODEL 4001

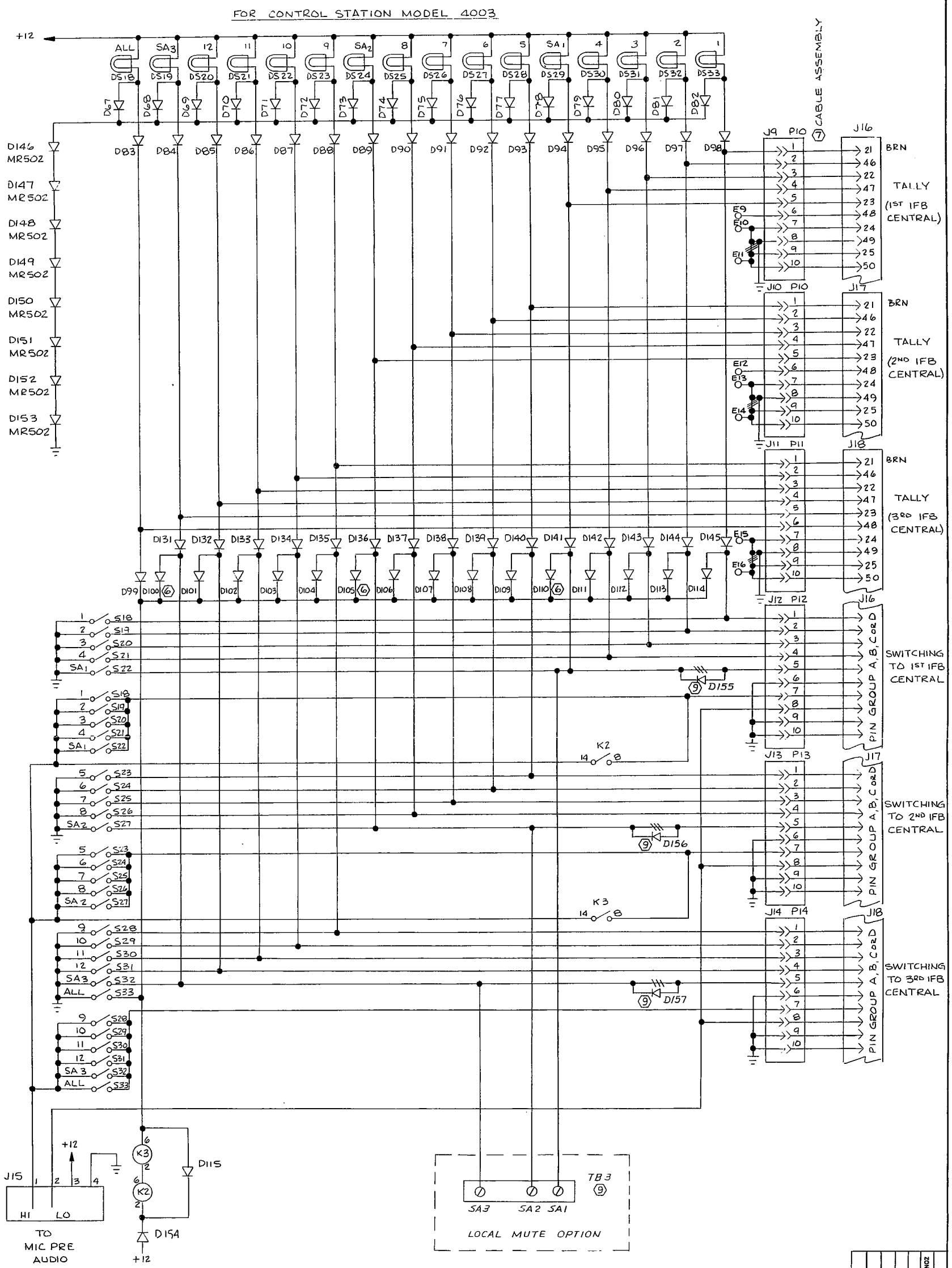


NOTES: (FOR COMPLETE NOTES SEE PAGE 2)

PIN GROUP A: 1, 26, 2, 27, 3, 28, 4, 29, 5, 30. (PRIORITY/CONTROL 1)
PIN GROUP B: 6, 31, 7, 32, 8, 33, 9, 34, 10, 35. (PRIORITY/CONTROL 2)
PIN GROUP C: 11, 36, 12, 37, 13, 38, 14, 39, 15, 40. (PRIORITY/CONTROL 3)
PIN GROUP D: 16, 41, 17, 42, 18, 43, 19, 44, 20, 45. (PRIORITY/CONTROL 4)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±	CONTRACT NO. SERIES 4000
MATERIAL	APPROVALS / DATE
FINISH	DRAWN CAMPBELL 12-17-79
NEXT ASSY / USED ON	CHECKED DAN R 4-16-80
APPLICATION	ISSUED
DO NOT SCALE DRAWING	SCHEMATIC DIAGRAM, IFB SYSTEM, SERIES 4000, CONTROL STATION MODELS 4001, 4002 & 4003
	SIZE D / FSCM NO. 60572 / DWG. NO. SD2043 / REV. R
	SCALE — / SHEET 1 OF 2

SD2043,
Schematic Diagram, IFB System, Control Station,
Model 4001-4003, Sheet 1 of 2



11. K1=GORDOS #835C-3, 500 ohms, 12 VOLT DIP RELAY.
    K2 AND K3 = MOUSER # ME431-2305, 150 ohms, 5 VOLT COIL RELAY, FORM 1C.
(10) *FOR DYNAMIC MIC USE ALTERNATE CIRCUITRY AS SHOWN IN DETAIL A.*
(9) *FOR LOCAL MUTE OPTION, TO WORK WITH SA, CUT TRACE & ADD DIODES (4003 ADD D155 - D157; 4002 ADD D155, D156; 4001 ADD D155). ADD TERMINAL BLOCK, TB3*
8 D154 IS USED ON MODEL 4002 AND 4003 ONLY.
(7) CABLE ASSEMBLY PART NO. 9020-2438-00.
(9) OPTIONAL DIODES ONLY: D25, D56, D61, D100, D105, D110.
THESE DIODES CAUSE SA TO WORK TOGETHER WITH IFB ALL.
(5) *NOT USED*

4. PIN GROUP A : 1, 26, 2, 27, 3, 28, 4, 29, 5, 30. (PRIORITY/CONTROL 1)
   PIN GROUP B : 6, 31, 7, 32, 8, 33, 9, 34, 10, 35. (PRIORITY/CONTROL 2)
   PIN GROUP C : 11, 36, 12, 37, 13, 38, 14, 39, 15, 40. (PRIORITY/CONTROL 3)
   PIN GROUP D : 16, 41, 17, 42, 18, 43, 19, 44, 20, 45. (PRIORITY/CONTROL 4)
3. ALL DIODES ARE IN4004
2. CAPACITANCE VALUES ARE SHOWN MICROFARADS/VOLTS.
1. ALL RESISTORS ARE CARBON FILM, 1/4 WATT, ±5%.

NOTES: (UNLESS OTHERWISE SPECIFIED)

LAST USED: C15, D157, DS33, J15, K3, Q2, R15, T1, U3.

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	L	REDESIGNED MIC PRE	9-6-85	
	M	ADDED DYNAMIC MIC OPTION PER ECO 1596	3-27-86	
	N	REVISED PER ECO # 1599	4-2-86	
	P	MODIFIED FOR HUM PROBLEM ECO 1714 CN	10-27-86	
	R	ADDED NOTE 11 PER ECO 2030 RN	11-2-87	-

APPLICATION — NEXT ASSY — USED ON

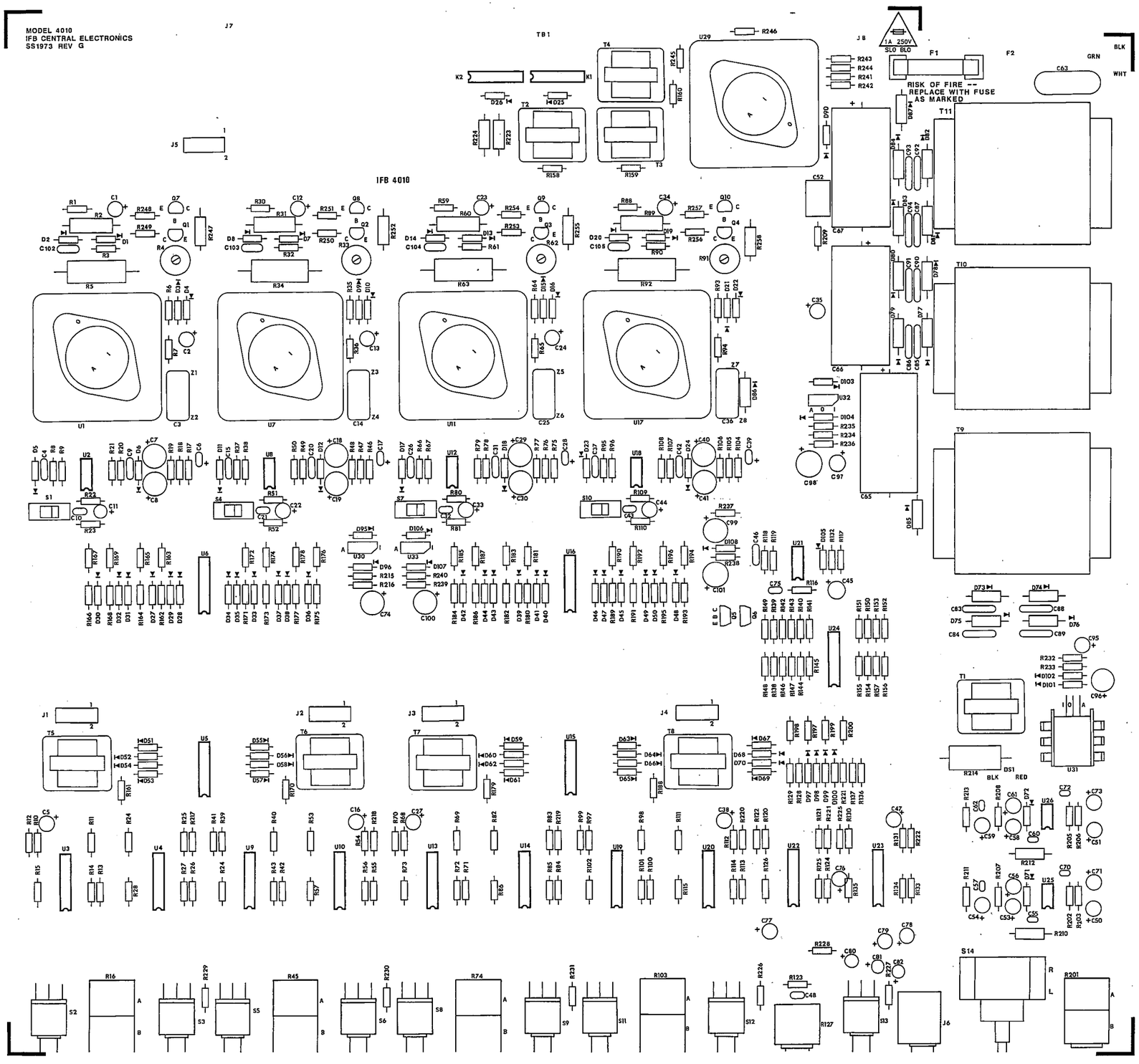
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±
MATERIAL
FINISH
DO NOT SCALE DRAWING

	DRAWN	APPROVALS	DATE
CHECKED	CAMPBELL		12-17-79
ISSUED	R		4-16-80

CONTRACT NO. SERIES 4000

SCHEMATIC DIAGRAM
IFB SYSTEM, SERIES 4000,
CONTROL STATION MODELS 4001, 4002 & 4003

SIZE D | FSCM NO. 60572 | DWG. NO. SD2043 | REV R
SCALE — | SHEET 2 OF 2



REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	PER ECO #1161	6-17-80	
	B	PER ECO 343	6-21-81	
	C	PER ECO 618	4-29-82	

SS1973,
Silkscreen Master, P.C.B.,
IFB Central Electronics, Model 4010

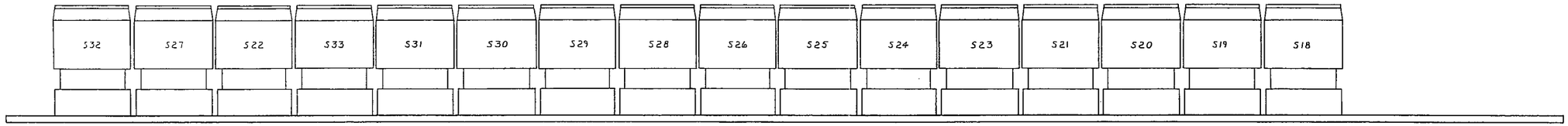
Added JL Fuse (F1)
Nomenclature to Silkscreen
ECO 3018 6 Nov 90

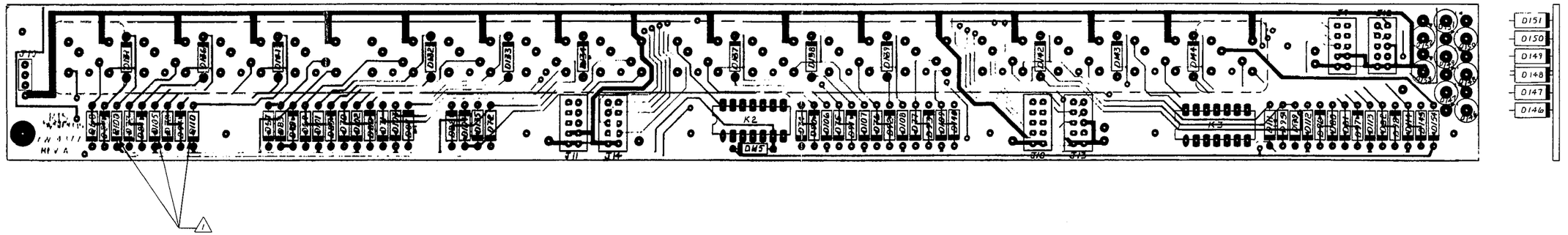
RTS SYSTEMS

Silkscreen Master
IFB Central Electronics
Model 4010 PCB

SS1973 **Rev. F** **Sheet 1 of 1**

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED





2. FOR PART NUMBERS & DESCRIPTIONS SEE SEPARATE PARTS LIST

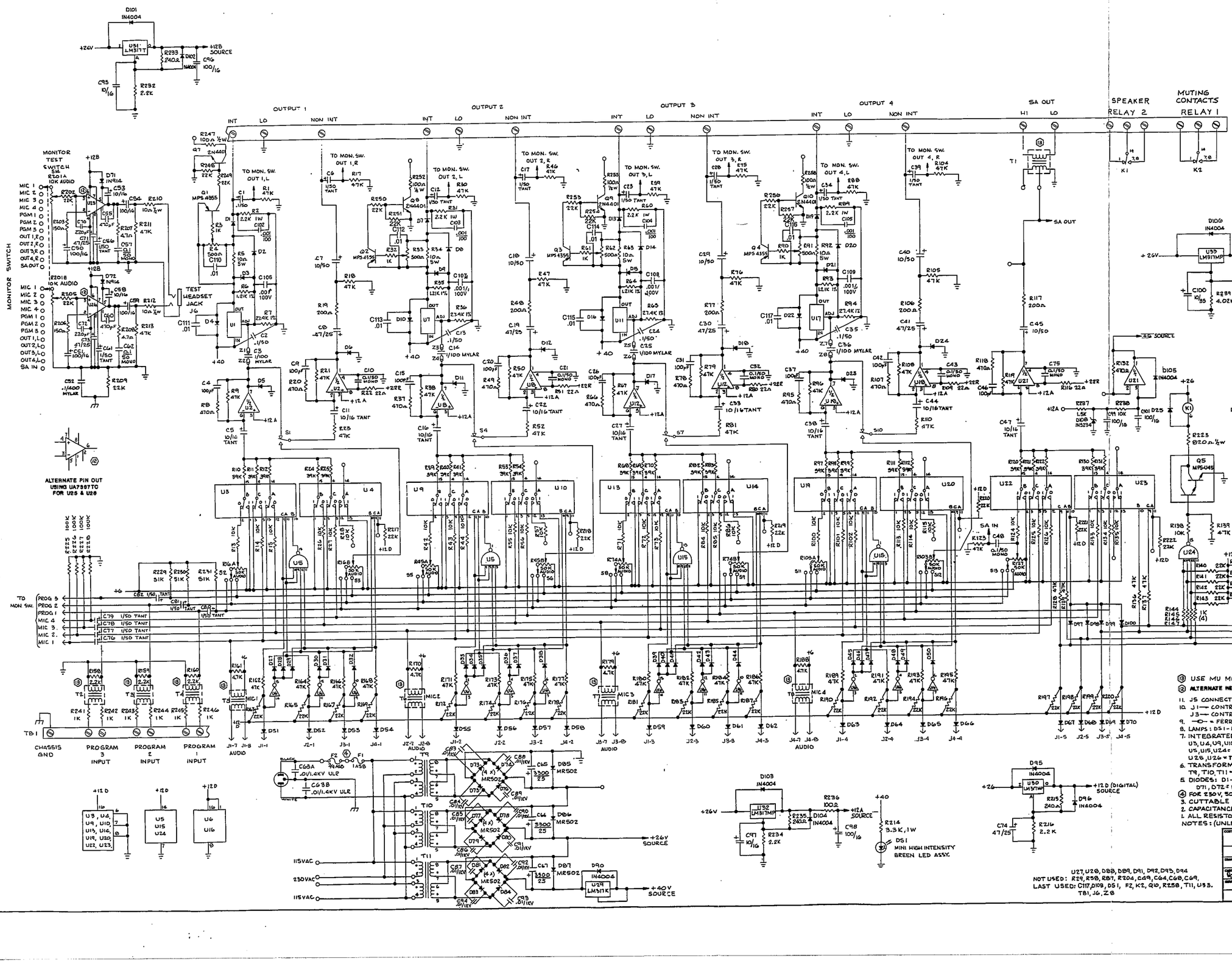
⚠1 FOR PRODUCTION UNITS LEAVE OUT D100, D105 & D110. USE D100, D105 & D110 WHEN REQUIREMENTS CALL FOR SA1, SA2 & SA3 TO WORK WITH IFB ALL.

NOTES:

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±	CONTRACT NO. PRODUCT LINE		
MATERIAL	APPROVALS	DATE	ASSEMBLY— CONTROL PANEL, 12 STATION, IFB, MODEL 4003
	DRAWN R. NEILSON	10-15-85	
FINISH	CHECKED		
	ISSUED		SIZE D FSCM NO. 60572 DWG. NO. AS 4377 REV.
DO NOT SCALE DRAWING			SCALE 2:1 SHEET

AS4377,
Assembly Diagram, Control Panel,
12 Station, IFB System, Model 4003

ZONE	REV.	REVISIONS DESCRIPTION	DATE	APPROVED
	A	R6, R35, R64, R93 WERE 1.2K, ¼W. R7, R34, R65, R94 WERE 27K, ¼W. C3, C14, C25, C36 ADDED FERRITE BEADS	4-21-80	
	B	PER ECO #144 ADDED RELAY PIN NOS.	6-6-80	
	C	UPDATED PER ECO # 156	6-12-80	
	D	UPDATED PER ECO # 159	6-16-80	
	E	UPDATED PER ECO # 249	1-28-81	
	F	UPDATED PER ECO # 488	6-15-83	
	G	REVISED PER ECO # 1280 GM	8-28-84	
	H	REVISED PER ECO 1318 PMD	11-1-84	
	J	CORRECTED PIN OUT OF U28 & U29. CHANGED MARK 10 & ADDED TERMINAL TO NOTE 7. PER ECO 2007	6-19-87	
	K	ADDED NOTE 13 PER ECO 1956	8-14-87	
	L	ADDED C106-C109 PER ECO 2066	11-5-87	



(18) USE MU METAL SHIELD OVER T1-T8

(12) ALTERNATE HEADPHONE/SPEAKER AMP: UA7807TC.

11. J5 CONNECTOR NOT SHOWN ON SCHEMATIC.
10. J1 — CONTROL STATION 1; J2 — CONTROL STATION 2; J3 — CONTROL STATION 3; J4 — CONTROL STATION 4.
9. —○— = FERRITE BEAD, Z1-Z8 ON C3, C14, C25, C36.
8. LAMPS: DS1-DS4 = MOU-5179-1764, 28V.
7. INTEGRATED CIRCUITS: U1, U7, U11, U17 = LM317K; U2, U8, U12, U18, U21 = MC3358; U3, U4, U9, U10, U13, U14, U19, U20, U22, U23 = CD4093AE; U5, U15, U24 = MC14012; U6, U16 = CD4049AE OR MC14049BCP; U25, U26 = TBA820M.
6. TRANSFORMERS: T1-T8 = BOURNS LM9003, OR SENTINEL 80LA8009; T9, T10, T11 = SIGNAL EP20-600
5. DIODES: D1-D26 = IN4004; D27-D50 = IN914; DS1-D70 = IN4004; D71, D72 = IN916; D88-90, 93-96 = IN4004; D97-100 = IN914.
4. FOR 230V, 50Hz OPERATION, CHANGE F1 TO ½ ASB, F2 TO ⅜ ASB.
3. CUTTABLE TRACES ARE SHOWN: ✂
2. CAPACITANCE VALUES ARE SHOWN: MICROFARADS / VOLTS.
1. ALL RESISTORS ARE CARBON FILM, ¼ WATT, ±5%.

NOTES: (UNLESS OTHERWISE SPECIFIED)

NOT USED: R29, R58, R87, R204, C49, C64, C68, C69.
LAST USED: C117, D109, DS1, F2, K2, Q10, R258, T11, U33.
T81, J6, Z8

CONTRACT NO.	PRODUCT LINE
APPROVALS / DATE	SCHEMATIC DIAGRAM, IFB CENTRAL ELECTRONICS, MODEL 4010
DRAWN CAMPBELL 11-20-79	
CHECKED Tom R 4/21/80	
ISSUED	SIZE E / DWG. NO. SD1914 / REV. L
	SCALE — / SHEET 1 OF 1

SD1914,
Schematic Diagram, IFB Central Electronics,
Model 4010